The Journal of the SOCIETY OF DYERS AND COLOURISTS

Volume 69 Number 1

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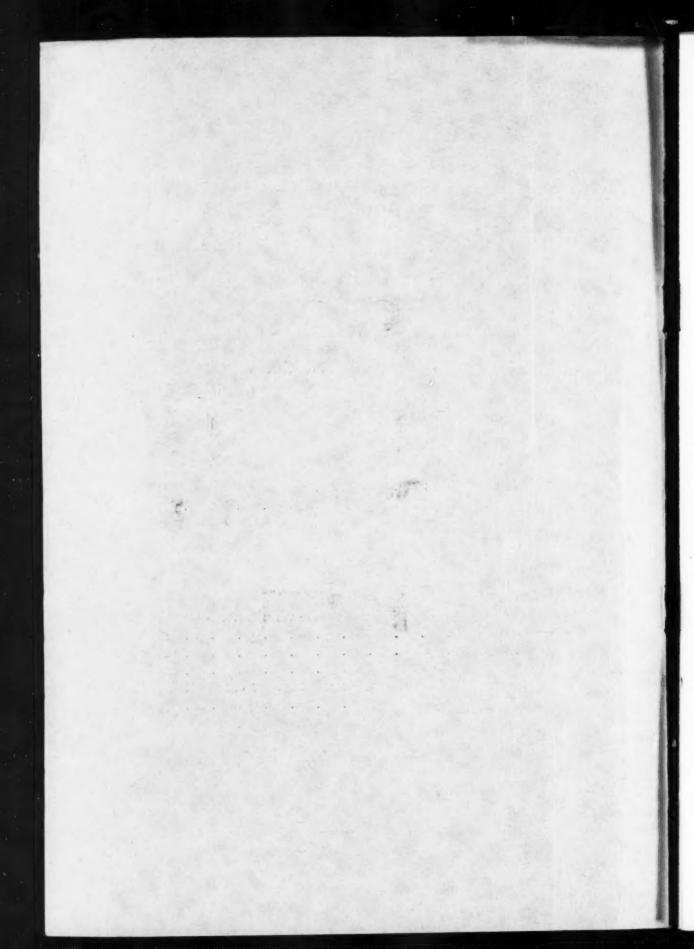
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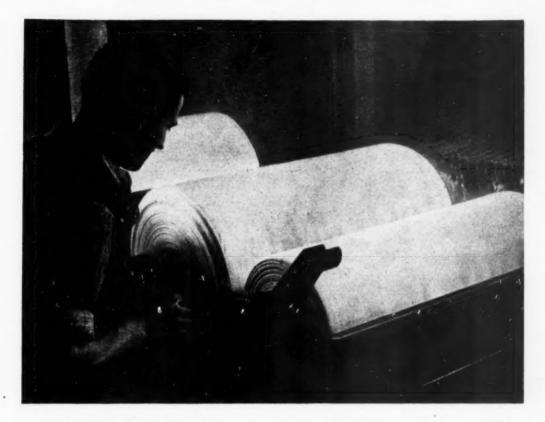


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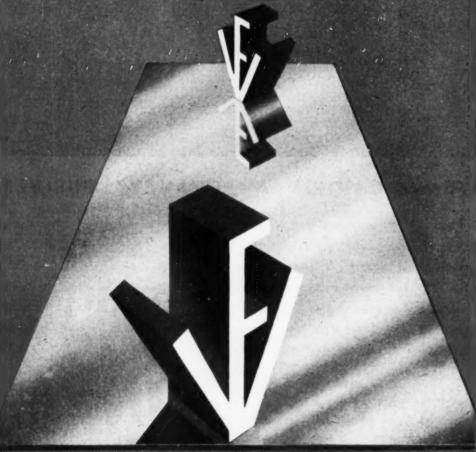
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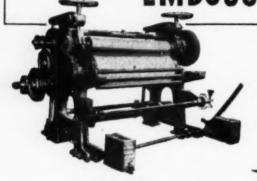
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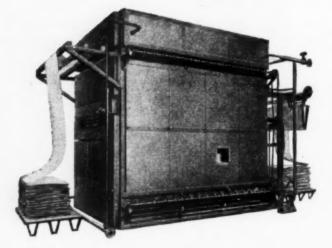
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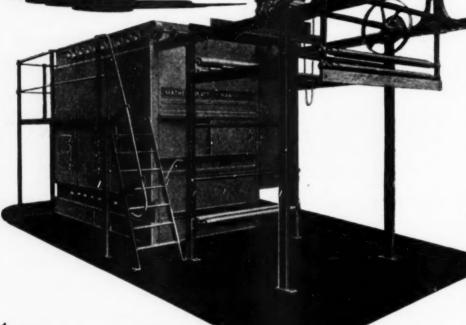
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Volume 3

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Editors

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NOTICE TO MEMBERS AND SUBSCRIBERS

Readers requiring general information regarding the Official Notices, List of Officers of the Society, etc. should consult pages 1-6 of the January 1953 and pages 237-240 of the July 1952 issues of the Journal, or write to The General Secretary, The Society of Dyers and Colourists, Dean House, 19 Piccadilly, Bradford, Yorkshire (Telephone Bradford 25138-9). Editorial Communications should be addressed to The Editor, at the same address.

Forthcoming Papers

The following papers have been accepted by the Publications Committee, and will appear in future issues of the Journal—

LECTURES

Fluorescent Dyes and the Application of Fluorescence to Textiles T. Thorne Baker

A Survey of the Quality of Crease-resist Treatment on Fabrics supplied to the Retail Trade H. W. Best-Gordon

The Dyeing and Finishing of Warp-knitted Fabrics made from Rayon and Synthetic Fibres

J. Bromley and A. G. Cheek

COMMUNICATIONS

Zacharie Roussin

R. Brightman

The Dyeing of a Blend of Wool and Fibrolane for the Hand-knitting Trade

R. C. Cheetham

Studies in the Fundamental Processes of Textile
Printing. V— The Transfer of Disperse and
Water-soluble Dyes to Cellulose Acetate during
Steaming

E. H. Daruwalla and H. A. Turner

MEMBERS' CHANGES OF ADDRESS

Anderson, F. G., formerly of 28 Exchange Street, to 47-49 York Lane, Belfast, N. Ireland

Boomer, J. A., formerly of Lungan, Co. Down, N. Ireland, to Magheeralane Road, Randalstown, Co. Antrim, N. Ireland

Booth, Dr. B. D., formerly of Lyddon Wall, Virginia Road, Leeds 2, to 29 March Street, Belle Vue Hill, Sydney, Australia

Brabandere, Et. de, formerly of 5 Avenue Louise, to Centre Technique de l'Industrie, Textile Belge, 24 rue Montoyer, Brussels, Belgium Bruckmann, P., formerly of 7-9 St. James's Street, SW1, to 11A Albemarle Street, London W1

Heaton, J. S., formerly of Dinting, Glos., to Tame House, Reddish Vale, Stockport, Cheshire

Holden, G. E., formerly of Sale, Cheshire, to "Strathavon", 186 Brooklands Road, Brooklands, Manchester

Radley, J. A., formerly of Tilehurst, to Chemical Consultant, 220-222 Elgar Road, Reading, Berks.

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Forthcoming Meetings of the Society (see also page xxxiii)

Friday-27th March 1953

THIRD GEORGE DOUGLAS LECTURE Dr. T. Holbro The Search for New Dyes in Relation to Modern Developments in the Textile Field The University, Leeds

Thursday-9th April 1953 at 7-30 p.m.

TENTH MERCER LECTURE J. R. Blockey, M.Sc., F.R.I.C., and D. H. Tuck, A.L.C. The Coloration of Leather Royal Institution, Albemarle Street, London W.1

Friday-10th April 1953

ANNUAL GENERAL MEETING and DINNER of the Society May Fair Hotel, London W.1

MANCHESTER SECTION

Unless otherwise stated meetings are held in the Textile Institute, 10 Blackfriars Street, Manchester 3, and commence at 6.30 p.m.

1953

Friday
20th Feb.

W. Speke, Esq., B.Sc. (I.C.I. Ltd., Dyestuffs Div.). High Temperature Dyeing of Viscose Rayon

Friday Manchester College of Technology. After-13th March noon and Evening Symposium on New Fibres. Details to be announced later

Friday

20th March

Managers of Textile Works. Midland Hotel,

Manchester. Lecture by Dr. Fargher

(Shirley Institute). Details to be announced

Friday Annual General Meeting. Details of 17th April lecture to be announced later

NORTHERN IRELAND SECTION

1953

Wednesday

11th Feb.

F. H. Marsh, Esq. (Longclose Engineering
Co. Ltd.). Pressure Dyeing and Bleaching
with Possible Indication of New Developments

Wednesday Dr. B. C. Gee. The Educational Side of 11th March Textile Processing

March/April Annual General Meeting and Dinner (date will be announced later)

LONDON SECTION

All meetings held at 6 p.m. in the Rooms of the Royal Society, Burlington House, Piccadilly, London W.1, unless otherwise stated

1953

Friday
6th Feb.
Friday
6th March
Friday
7tile to be announced later

MIDLANDS SECTION

Except when otherwise stated, Lecture Meetings commence at 7 p.m.

1953

Thursday
19th Feb.

B. M. Walker, Esq., F.T.I., F.R.M.S. The
Chemist and Technologist in the Hosiery and
Knitted Goods Industry. (Joint meeting with
the Textile Institute). Carpet Trades
Canteen, Kidderminster, 7.30 p.m.

Wednesday E. R. Wiltshire, Esq., B.Sc. Azoic and other Fast Dyes on Knitted Cotton Fabric. College of Technology, Leicester

Midlands Section-continued

Friday MIDLANDS SECTION DINNER. Royal Hotel, 13th March Leicester

Wednesday
18th March
M.M. Colour in Chemistry (Joint meeting
with the British Association of Chemists).
School of Arts and Crafts, Derby

Wednesday Annual General Meeting of the Section. 22nd April Gas Board Theatre, Nottingham

Towards the end of the session Dr. H. White (Textile Research Institute, Princeton, U.S.A.) will lecture in Nottingham. Particulars later

HUDDERSFIELD SECTION

All meetings held at Field's Cafe, Huddersfield, at 7.30 p.m., unless otherwise stated

1953

Tuesday Inter-sectional Discussion 17th Feb.

Tuesday Dr. H. A. Thomas (Courtaulds). The Rôle 17th March of Dyeing, Printing, and Finishing in Fabric Development

Tuesday
7th April
Annual General Meeting followed by a lecture— Dr. J. F. Gaunt. A Study of the Afterchrome Process of Wool Dyeing

SCOTTISH SECTION

All meetings at St. Enoch Hotel, Glasgow, 7 p.m., unless otherwise stated

1953

Tuesday J. Barr, Esq. (Turnbull's Ltd.) Some Problems 17th Feb. of the Dry Cleaner and Dyer

Tuesday 17th Mar.

ANNUAL GENERAL MEETING, to be held at the ROYAL TECHNICAL COLLEGE, GLASGOW at 7 P.M. and NOT at the ST. ENOCH HOTEL as previously announced. To be followed by Brains Trust at 7.30 p.m.

The Panel is to be formed from Sectional Members and details will be circularised later. By courtesy of the College Authorities an invitation has been extended to inspect the new laboratories on this occasion.

MANCHESTER JUNIOR BRANCH

All meetings commence at 6.30 p.m. in the Reynolds' Halt, College of Technology, Manchester.

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Monday Dyeing and Finishing. The Public's Reaction to Fastness Properties J. S. Ingham Esq.

Monday Title to be given later.

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THE JOURNAL

OF THE

Society of Dyers and Colourists

Volume 69-Number 1

JANUARY 1953

Issued Monthly

OFFICIAL NOTICES

ELECTION OF OFFICERS AND MEMBERS OF COUNCIL

Under the revised Bye-laws which are now operative, Officers and Members of Council—other than the President and President-elect, who are nominated by Council and elected at the Annual General Meeting—are to be elected by a Postal Ballot of the members.

The attention of members is drawn to Bye-laws No.

12-21 inclusive and 22-26 inclusive, which relate to Officers and Members of Council respectively.

Nominations to be valid must be received by the Honorary Secretary of the Society at least six weeks prior to the date of the Annual General Meeting, which is on 10th April 1953.

MEMBERS AND JUNIOR MEMBERS

Persons desirous of joining the Society as Ordinary Members or Junior Members may obtain Application Forms from the General Secretary or from the Honorary Secretary of any Section of the Society. Applications must be proposed and seconded by members to whom the applicants are known personally. The rates of annual subscription are as follows—

- (i) During the period of "full-time national service" the annual subscription to be waived entirely. Such members will be asked whether they wish to receive the *Journal*.
- (ii) Ordinary Members between the ages of 21 and 25 years who are students, i.e. who are pursuing an accepted course, full or part time, at a recognised

technical college or university and vouched for by the head of their department or other responsible person—15s. 0d.

- (iii) Other Ordinary Members between the ages of 21 and 25 years—£2 2s. 0d.
- (iv) Members having had forty years' continuous membership of the Society to be given the option of paying half the current annual subscription (vi) for Ordinary Members.
- (v) Members having had fifty years' continuous membership of the Society—the annual subscription to be waived entirely.
- (vi) All other Ordinary Members- £3 3s. 0d.
- (vii) All other Junior Members-15s. 0d.

The JOURNAL

The Journal is posted free to all Members. Non-members can obtain copies on application to the Offices of the Society. All orders must be accompanied by a remittance of 6s. 8d. per copy (£4 0s. 0d. per annum post free). Back numbers of most issues of the Society's Journal can be supplied.

Members are reminded that under Bye-law 41 the *Journal* will not be forwarded to those who have not paid their subscription by 30th June 1953.

Members residing abroad are particularly requested to inform the General Secretary by separate post when sending their subscriptions by Money Order.

Communications on any subject related to the objects of the Society, especially such as are of an original character, are invited for consideration for publication in the Journal. Such Communications in the first instance should be addressed to the Editor, Society of Dyers and Colourists, 19 Piccadilly, Bradford, Yorks.

General communications, including inquiries or orders for advertisements, should be addressed to the Offices of the Society, to which address all remittances should be sent.

REPRINTS OF LECTURES AND COMMUNICATIONS

Reprints of all lectures and communications are available after publication to members of the Society and

non-members. The charges (postage included) are as follows—Single copies 2s. 6d. each; per dozen copies up to and including 8 pages, 12s. 6d., and for papers occupying more than 8 pages of the Journal, 17s. Orders should be addressed to "The Society of Dyers and Colourists, 19 Piccadilly, Bradford". They can be accepted only if accompanied by remittance and if received immediately after publication of the paper.

ABSTRACTS SECTION

Attention is drawn to the fact that copies of the Abstracts Section of the Journal printed on only one side of the paper, so that individual abstracts can be cut out and pasted on cards, are available at a charge of 30s. 0d. per annum. Orders should be sent to the Society's offices at 19 Piccadilly, Bradford, Yorks.

FREE ADVERTISEMENTS

For the convenience of members the Publications Committee allows a limited number of advertisements relating to SITUATIONS WANTED to be inserted in the Journal gratis. Such advertisements must not exceed 24 words in length.

Replies may be addressed, Box—, Society of Dyers and Colourists, 19 Piccadilly, Bradford, Yorks.

NOTICE TO AUTHORS OF PAPERS

The MSS. of all papers communicated to or read before the Society become the property of the Society. They should be addressed to the Editor, Society of Dyers and Colourists, 19 Piccadilly, Bradford. Authors must not allow their papers to be published elsewhere before they have appeared in the Society's Journal. Should prior publication take place without the sanction of the Publications Committee, the paper will be printed only as an abstract or summary.

Manuscripts submitted for publication in the Journal should be typewritten (double spacing) on good-quality paper, using one side of the paper only and leaving a margin at least 1 in, wide on the left-hand side. The time taken in refereeing papers (both lectures and communications) will be reduced to a minimum when authors submit two copies of the typescript.

In view of the high costs of publication, it is essential that authors should be as concise as possible. When experimental procedure has already been published, a literature reference to the paper containing the details is sufficient, whilst well known experimental methods should be described very briefly.

Introductory paragraphs describing the aims of the investigation and the method of attack are desirable, and should be followed by the experimental results and their discussion. There should be a brief summary for insertion at the beginning of the paper. Centre headings should be employed sparingly. Side headings should be indented and underlined, and run into the text to which they apply by means of a dash. References to the literature should be numbered consecutively, using superscript numbers

without brackets immediately following the text words or author's name to which they refer.

The list of references should be given at the end of the manuscript and the abbreviations used should be, as far as possible, those given in the "List of Periodicals Abstracted" included at the end of the Index to the preceding year's Journal.* Reference numbers in this list should be neither enclosed in brackets nor followed by full-stops. As far as possible throughout the manuscript the abbreviations listed in the Jan. 1950 issue (p. 54) should be used. Tables should be numbered consecutively in Roman numerals and Figures in Arabic numerals.

The number of figures and graphs should be kept as low as possible, and data should be presented in the form of either tables or graphs, not both. Drawings should be carefully prepared, preferably in Indian ink, on plain white drawing paper or, preferably, Bristol board. In graphs, the frame and actual curves should be ruled and inked more heavily than any co-ordinate lines, and the latter should not be close together as in ordinary graph paper. Experimental points should always be given, and they should be indicated by small circles rather than by crosses in the case of a single graph, but where several graphs appear in a single Figure clear means of differentiation must be adopted. All numbers and legends are set up in type by the printer, and authors should therefore indicate them lightly in pencil.

Twenty-five free copies of a reprint are supplied to the author of an original paper published in the Journal, or fifty free copies are supplied when there are two or make authors, and a further number may be purchased from the Society at the rates given on p. l.

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Lecturers are required to sign an agreement regarding copyright and publication, copies of which are supplied by the Honorary Secretaries of Sections.

The Society subscribes to the Royal Society Fair Copying Declaration (J.S.D.C., 66, 54 (Jan. 1950); 67, 236 (June 1951)).

LOAN OF BOOKS AND PERIODICALS

Many of the books and periodicals reviewed or abstracted in the *Journal* since 1948 (and in some cases earlier) are retained by the Society, and may be borrowed by members. Enquiries and applications should be directed to the Society of Dyers and Colourists, 19 Piccadilly, Bradford, Yorks.

LIBRARY OF THE CHEMICAL SOCIETY-LOAN OF BOOKS

Members of the Society may borrow books from the very extensive collection of works on pure and applied chemistry in the Library of the Chemical Society, by applying direct to The Librarian, Chemical Society,

Burlington House, Piccadilly, London W.1 (REGent 0675-6), and referring to their membership of the Society of Dyers and Colourists. Letters on the subject should not be addressed to the Offices of the Society in Bradford.

DEPOSIT OF SEALED COMMUNICATIONS

I.—The Society is prepared to receive from members and others and to keep as deposits, Scaled Communications dealing with any subject relating to the theory or practice of the Dyeing, Printing, and kindred industries.

II— Every deposit must bear on the cover a title for classification, the author's name, the date, and must be secured by a distinctive seal.

III — The deposit should be written in English, and, if it deals with machinery, be accompanied by sketches or drawings, or, in the case of dyeing or printing processes, by patterns.

IV— Every deposit will, unopened, be signed and sealed by the Honorary Secretary of the Society, immediately after receipt, and countersigned by another member of the Council.

V- The deposits will be numbered and entered into a

special register, and an official receipt will be sent to the author.

VI—No charge will be made for registration and deposit.

VII—The deposits will be kept by the Society for a period of seven years. At the end of this period they will be opened and the contents read before the next meeting of the Council of the Society, and the contents, or an abstract thereof, may be published in the Journal of the Society at the discretion of the Publications Committee.

VIII—The author shall have the right to recall his deposit unopened at any time within the said seven years, or he may, at any time, order it to be opened and read before one of the Society's meetings. Such instructions must be accompanied by the official receipt.

IX—The Society will take every reasonable care of the deposits, but cannot be held responsible for their loss.

MEDALS AND AWARDS

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1908-1915	*Prof. Dr. C. Liebermann	1934-1946	*H. Grandage
1911-1916	*Prof. Adolf von Baeyer	1934-1940	*Christopher Rawson
1914-1924	*Count Hilaire de Chardonnet	1941-1948	*Prof. E. C. C. Baly, C.B.E., M.Sc., F.R.S.
1917-1941	*Arthur G. Green, M.Sc., F.I.C., F.R.S.	1944-1946	Prof. F. M. Rowe, D.Sc., F.R.I.C., F.R.S.
1919-1938	*R. Vidal	1946-1946	*James S. Ridsdale
1921-1930	*Horace A. Lowe	1947	C. J. T. Cronshaw, D.Sc., F.R.I.C.,
1923-1935	*Charles F. Cross, F.R.S.		M.I.Chem.E., F.T.I., F.R.S.E.
1925-1927	*Maurice Prud'homme	1948	H. Jennison, M.C., A.M.C.T., A.R.I.C.
1927-1930	*Ernest Hickson	1950	George E. Holden, C.B.E., M.Sc., F.R.I.C.
1928-1939	*R. E. Schmidt		

The following have been ex officio Honorary Members of the Society, the later dates indicating termination or change in title of the office—

1886-1920	The Worshipful Master of the Dyers' Com-	1886-1900	The President, Bradford Technical College
1920-	pany The Prime Warden of the Worshipful Com- pany of Dyers	1900-1905	*W. E. B. Priestley, Chairman of the Technical Instruction Committee of the Bradford City Council

*Deceased

THE PERKIN MEDAL

The Perkin Medal was modelled by the late F. W. Pomeroy, R.A., for the Society. It is an excellent presentation of the head of Sir William Perkin, the founder of the coal-tar colour industry, and President of the Society in 1907.

This medal is awarded for discoveries or work of outstanding importance in connection with the tinctorial arts.

LIST OF RECIPIENTS

- 1908 Professors Graebe and Liebermann. "Synthesis of Alizarin."
- 1911 Prof. Adolf von Baeyer. "Synthesis of Indigo."
- 1914 Comte Hilaire de Chardonnet. "Artificial Silk."
- 1917 Prof. Arthur G. Green. "Primuline."
- 1919 R. Vidal. "Sulphur Black."
- 1921 Horace Lowe. "Permanent Lustre on Cotton."
- 1923 Chas. F. Cross. "Discovery of Viscose."
- 1925 M. Prud'homme. "Aniline Black and Alizarin Blue."
- 1928 Dr. Robert E. Schmidt. "For Epoch-making Discoveries of Anthraquinone Derivatives and Dyestuffs therefrom."
- 1938 Dr. H. Dreyfus. "For Discoveries and Work of Outstanding Importance in Connection with the Development of the Cellulose Acetate Rayon Industry in England."
- 1938 J. Baddiley. "In recognition of his National Services for the Renaissance of the British Dyestuffs Industry through Many Important Investigations in the Field of Colour Chemistry Conducted or Directed by him."
- 1950 Prof. J. B. Speakman. "In recognition of his Outstanding Contributions to the Science and Technology of Textiles."





THE MEDAL OF THE SOCIETY OF DYERS AND COLOURISTS

This Medal was instituted by the Society in 1908. Of the competitive designs submitted, that of Mr. Edgar Lockwood was selected. The design indicates that the work of the dyer (centre figure) is both a science (right background) and an art (left foreground).

- 1908–1927 The Medal was occasionally awarded as a recognition of work of exceptional merit carried out under the Society's Research Scheme.
- From 1928 The Medal was awarded as a recognition of exceptional services (a) to the Society or (b) in the interests of the Tinctorial and Allied Industries.

LIST OF RECIPIENTS

- 1908 J. B. Fothergill (Bronze Medal). "Treatment of Cotton to Cause it to Resist Direct Dyeing Colours."
- 1912 J. H. Garner (Silver Medal). "Treatment of Effluents from Dyehouses and Textile Factories."
- 1928 Ernest Hickson (Gold Medal). "Exceptional Services rendered to the Society as Chairman of the Publications Committee 1897–1925, and Chairman of Colour Index Committee."
- 1930 Arthur Silverwood (Gold Medal). "Exceptional Services rendered to the Society as Honorary Secretary 1913-1930."
- 1933 Prof. Walter M. Gardner (Gold Medal).
 "Distinguished Services as Editor of the Society's
 Journal 1900 to 1932."
- 1934 Prof. F. M. Rowe (Gold Medal). "Exceptional Services to the Society and to the Tinctorial Industries as Editor of the Colour Index 1924 and the 'Supplement' 1928."
 - L. A. Lantz (Chairman), H. H. Bowen, P. W. Cunliffe, R. S. Horsfall, Prof. B. A. McSwiney, C. C. N. Vass, C. M. Whittaker, S. G. Barker (Silver Medals). "Exceptional Services to the Society as Members of the Standardisation of Fastness Executive Committee."
- 1936 W. A. Edwards (Silver Medal). "Valuable Services rendered to the Society as Honorary Secretary of the Midlands Section since its inception in 1919 to 1935."
- 1937 R. Ritchie (Silver Medal). "Devoted and Valuable Services as Honorary Secretary of the Scottish Section for eighteen years."
- 1940 F. L. Goodall (Gold Medal). "Valuable Services to the Tinctorial Industries by his work on the Theory and Practice of Wool Dyeing."
- 1943 C. M. Whittaker (Gold Medal). "In recognition of Exceptional Services in promoting Scientific and Technical Knowledge amongst Textile Colourists, and for Sustained and Outstanding Service to the Society."
- 1946 H. H. Bowen (Gold Medal). "For Outstanding Services to the Society and in recognition of his Chairmanship of the Publications Committee for a period of twenty years."
 - H. H. Hodgson (Gold Medal). "For Outstanding Services to the Society and for his series of Sustained Experimental and Theoretical Contributions to those chapters of Organic Chemistry which are the essential scientific background to the Dyestuffs Industry."

- E. Race (Silver Medal). "For his Valued Services to the Society as Joint Author of thirteen papers published in the Society's *Journal*."
- H. Turner (Silver Medal). "In recognition of his Valuable Services to the Society and of his twentytwo years' service as Honorary Secretary of the Huddersfield Section."
- Mrs. E. Cummings (née Levin) (Silver Medal). "For her Valued Services to the Society; by her assistance rendered in the preparation of the first Colour Index; by her Joint Authorship of a number of Papers published in the Journal of the Society, and as an Abstractor for the Journal of the Society for twenty years."
- 1947 Fred Smith (Gold Medal). "For Exceptional Services to the Society over a period of thirty-seven years comprising Chairman, West Riding Section; Member of Council and of many important Committees."
 - F. Scholefield (Gold Medal). "In recognition of Exceptional Services to the Society in the advancement of Tinctorial Technology both in theory and practice."
 - C. Schardt (Silver Medal). "In recognition of his Valuable Services to the Society over a period of twenty-four years including Chairman, Vice-Chairman, and member, of the Midlands Section Committee."
- 1948 G. G. Hopkinson (Gold Medal). "For Valuable Services rendered to the Society and to the Dyeing Industry."
 - D. B. F. McAndrew (Silver Medal). "For Valuable Services rendered to the Society as Honorary Secretary and Committee Member of the Scottish Section 1935–1947."
 - C. O. Clark (Silver Medal). "For Valuable Services rendered to the Society from 1923 to 1948."
- 1949 S. M. Neale (Gold Medal). "For his Pioneer Work in the Application of the Methods of Physical Chemistry to the Elucidation of the Phenomena of Dyeing, more particularly of Cellulosic Materials with Substantive Dyes."
- 1950 P. W. Cunliffe (Gold Medal). "For Outstanding Services to the Society and to the Tinctorial and Allied Industries."
 - H. Foster (Gold Medal). "For Outstanding Services to the Society."
 - L. A. Lantz (Bar attached to Silver Medal previously awarded). "For Exceptional Services to the Society and to the Tinctorial and Allied Industries in connection with Fastness Tests."
- 1951 W. Kilby (Gold Medal). "For Work on the Development of a Molten Metal Process of Continuous Dyeing."

THE WORSHIPFUL COMPANY OF DYERS RESEARCH MEDAL

The Medal represents the Arms of the Worshipful Company of Dyers of the City of London, which were granted in 1471. The following is a brief description-

Arms-Sable, a chevron engrailed argent, between three bags of madder of the last, corded or.

Crest-On a wreath three sprigs of the graintree erect vert, fructed gules. Supporters-Two leopards rampant gardant argent, spotted with various colours; fire issuing from their ears and mouth proper, both ducally crowned or.

Motto- Da Gloriam Deo.

I- The Dyers' Company offer annually a Gold Medal called "The Worshipful Company of Dyers Research Medal", the award of which is open to the Authors of papers embodying the results of acientific research or technical investigation connected with the tinctorial arts submitted to the Society of Dyers and Colourists, and published in the Journal of such Society during the twelve months ending on the 30th June in the year for which the Medal is granted, and, in the special circumstance provided for by Rule 6, during the twelve months ending on the 30th June in the year previous to that for which the Medal is granted. If a paper

shall be published in two or more parts, then for the purpose of the award of the Medal, all the parts together shall be treated as a paper published in the year in which the final part is published.

2—The Medal will not be awarded to the same person on more than one occasion.

3- The Society of Dyers and Colourists shall consider the papers available for the Medal and advise the Company as to the merits thereof, and if, in the judgment of the Society, none of the papers is of sufficient merit, the Society

may recommend that the Medal be not awarded.

4—The Dyers' Company will award the Medal either to the Author of the paper which, in all the circumstances appears to the Company to show the greatest merit, or, in the event of such paper being the work of an Author who has already been awarded the Medal, to the Author of the paper next in order of merit who has not already been awarded the Medal, and may, if the Company so thinks fit, refrair from making any award.

5— In the event of a paper being the work of two or more persons, the Author shall be taken to be that one of them whose work in the opinion of the Society of Dyers and Colourists has most substantially contributed to the

merit of the scientific research or technical investigation embodied in such paper.

6- In the event of the Author of a paper of sufficient merit published in the Journal of the Society of Dyers and Colourists during any twelve months for which the Medal is awarded being unsuccessful in obtaining the award of the Medal for that period, the Society of Dyers and Colourists may, in their discretion, consider such paper for adjudication with the papers available for the award of the Medal for the next succeeding twelve months.

LIST OF RECIPIENTS

- Prof. E. Knecht. "A Means of Estimating 1922–23 Prof. Arthur G. Green (Bar attached to Medal previously awarded), and K. H. Saunders.
 "The Ionamines— A New Class of Dyestuffs for 1908 the Degree of Mercerisation in Cotton Yarns. Prof. Arthur G. Green. "The Chemical Cellulose Acetate Silk." Technology of Aniline Black."
- 1910-11 R. L. Taylor. "The Action of Carbon Dioxide and of Air on Bleaching Powder.
- W. Harrison. "The Electrical Theory of Dyeing.
- S. H. Higgins. "Observations on the Bleaching of Cotton" and "The Action of Neutral Salts 1912-13 on Bleaching Solutions."
- 1913-14 W. Johnson (in conjunction with Prof. Arthur G. Green, who had already been awarded the Medal). "The Constitution of Aged and of Bichromate Aniline Blacks"
- Morris Fort. "The Mechanism of the Acid Dye-1914-15 bath.
- 1915-16 James R. Hannay. "The Interaction between Metallic Copper and certain Dyes of the Thiazine, Oxazine and Azine Series.
- 1916-17 Prof. H. M. Dawson. "The Phenomena of Acid Catalysis and the Theory of Acids."
- 1917-18 L. G. Radcliffe. "The Sulphonation of Fixed
- Chas. F. Cross (Diplomas presented to M. C. Lamb and C. V. Greenwood as co-authors). "Colloidal Tannin Compounds and their Appli-
- A. E. Everest (Diploma presented to A. J. Hall as co-author). "The Tinctorial Properties of 1919-20 some Anthocyans and certain Related Com-
- Prof. G. T. Morgan. "The Co-ordination Theory 1920-21 of Valency in Relation to Adjective Dyeing.
- "On the Fluorescence of S. Judd Lewis. 1921-22 Cellulose and its Derivatives."

- 1923-24 S. Judd Lewis (Bar attached to Medal pre-viously awarded). "The Quantitative Determination of the Fluorescent Power of Cellulose and its Derivatives.'
- 1924-25 Prof. F. M. Rowe (with Diploma to Miss E. Levin, as co-author). "The Identification of Azo Colours on the Fibre and of Azo Pigments in Substance."
- 1925-26 H. H. Hodgson. "Behaviour of the Sulphides of Sodium in Aqueous and Alcoholic Media' and "The Action of Sulphur on the Monochlor-
- Prof. F. M. Rowe (Bar attached to Medal previously awarded) and Diplomas awarded to collaborators—Miss E. Levin, A. C. Burns, J. S. H. Davies, and W. Tepper. "A New Reaction of Certain Diazosulphonates derived from β -Naphthol-1-sulphonic acid, leading to the preparation of Phthalazine, Phthalazone and Phthalimidine Derivatives."
- 1927-28 No award.
- 1928-29 F. Scholefield (with diplomas to Miss E. Hibbert and C. K. Patel as co-authors). "The Action of Light on Dyed Colours.'
- 1929-30 H. H. Hodgson (Bar attached to Medal pre-viously awarded). "Colour and Constitution from the Standpoint of Recent Electronic Theory."
- Prof. F. M. Rowe (Second Bar attached to Medal previously awarded), and Diplomas awarded to S. Ueno and F. H. Jowett as collaborators. "Insoluble Azo Colours on the 1930-31 Fibre and Action of Boiling Caustic Soda

- 1931-32 No award.
- 1932-33 Two awards - W. T. Astbury. Two awards—W. T. Astbury. "The X-ray Interpretation of Fibre Structure." J. B. Speakman. "The Structure of the Wool Fibre; its Relation to the Dyeing and Finishing Processes of the Wool Textile Trade.
- 1933-34 No award.
- H. A. Turner, and Diplomas awarded to G. M. Nabar and F. Scholefield, as co-authors. "The 1934-35 effect of Reduced Vat Dyes upon the Hypochlorite Oxidation of Cellulose.
- Prof. F. M. Rowe (Third Bar attached to Medal previously awarded), and Diplomas awarded to C. H. Giles, R. L. M. Allen, W. G. 1935-36 Dangerfield, and Glyn Owen, as collaborators. Decomposition of Azo Dyes by Acids, Caustic Alkalis, and Reducing Agents.
- 1936-37 J. B. Speakman (Bar attached to Medal previously awarded), and Diplomas awarded to C. S. Whewell and J. L. Stoves, as collaborators. "The Reactivity of the Sulphur Linkage in Animal Fibres."
- Prof. F. M. Rowe (Fourth Bar attached to Medal previously awarded), and J. B. Speakman 1937-38 (Second Bar attached to Medal previously awarded), and Diplomas awarded to E. Race and T. Vickerstaff, as collaborators. "The Unlevel Dyeing of Wool with Acid and Chrome Dyes. Part I—The Reasons for the Uneven Dyeing Properties of Wool Staples and of Cloth Damaged by Exposure, and Part II—A
 Method for Correcting the Uneven Dyeing
 Properties of Wool Staples and of Cloth
 Damaged by Exposure."

- 1938-39 No award.
- 1939-40 T. H. Morton, as senior author of the paper on 'Application of Vat Dyes to Viscose Rayon", by J. Boulton and T. H. Morton.
- 1940-41 No award.
- 1941-42 T. Vickerstaff, as senior author of the paper on "The Dyeing of Cellulose Acetate Rayon with Dispersed Dyes", by T. Vickerstaff and E. Waters.
- 1942-43 No award.
- 1943-44 J. Boulton, "The Importance of Dyeing Ratean Interpretation for the Practical Dyer of Recent Research on Direct Dyeing."
- 1944-45 No award.
- 1945-46 No award.
- 1946-47 H. Phillips, as senior author of the paper on "The Chemical Constitution and Physical Properties of Bisulphited Wool", by E. G. H. Carter, W. R. Middlebrook, and H. Phillips.
- J. M. Preston. "Some Factors affecting the Dyeing of Viscose" and "Some Aspects of the 1947-48 Drying and Heating of Textiles'
- H. Lindley, as major contributor to the paper "The Mechanism of Set and Supercontraction in 1948-49 Wool Fibres", by S. Blackburn and H. Lindley.
- 1949-50 No award.
- J Crank. "The Diffusion of Direct Dyes into 1950-51 Cellulose. III—The Present State of the Theory and its Application".
- 1951-52 H. Hampson. "Advances in the Application of Vat Dyes to Viscose Rayon Cakes".

THE WORSHIPFUL COMPANY OF FELTMAKERS RESEARCH MEDAL

The Feltmakers' Company offer annually a Gold Medal for Papers embodying the results of scientific research or technical investigation connected with the art of feltmaking and published in the Journal of the Society. Further, in order to encourage research of a type likely to qualify for the award of the Medal, the Feltmakers' Company offer annually, for an initial period of five years, a Research Grant of £50.

1945-1952 No award.

KNECHT MEMORIAL FUND

A Fund of £100 was subscribed as a Memorial to the late Professor Edmund Knecht, from the interest on which two prizes, in the form of books, are awarded annually to selected students of the Manchester College of Technology and the Royal Technical College, Salford,

MERCER LECTURES

A sum of £20 per annum is being given to the Society for a limited period of years in commemoration of the centenary of the discovery of mercerisation. Suitable lecturers are invited to give a Mercer Lecture annually.

- N. G. McCulloch and G. S. Hibbert, "Science in an Old Industry.
- 1945 G. S. J. White, B.A., and T. Vickerstaff, Ph.D. "Colour.
- 1946 D. Entwistle, B.Sc., A.R.I.C. "Regenerated Fibres from Natural Polymers."
- 1947 E. J. Bowen, M.A., F.R.S. "Colour and Constitu-tion— The Absorption of Light by Chemical Compounds."
- 1948 F. Farrington, B.Sc., F.R.I.C. "Textile Printing."
- 1949 E. Wilson, B.A. "Some Applications of Chemistry to Textile Finishing."
- 1950 A. B. Meggy, Ph.D., A.R.I.C. "Some Developments in the Theory of Dyeing." "Some Recent
- D. Traill, Ph.D., F.R.I.C., F.T.I. "Some Trials by 1951 Ingenious Inquisitive Persons—Regenerated Protein Fibres.
- 1952 F. C. Wood, M.Se., Ph.D., F.R.I.C., F.T.I. "Non-felting Wool and Wool Mixtures."

GEORGE DOUGLAS LECTURE

A sum of £2000 was given to the Society by the Bradford Dyers' Association Ltd., the income from the investment of which is employed in providing a biennial lecture on some subject connected with the colouring or finishing of textiles.

- 1949 H. Levinstein, M.Sc., Ph.D., M.I.Chem.E., F.R.I.C. 1952 R. Hill, Ph.D. "Synthetic Fibres in Prospect and "George Douglas, His Times, and Some Thoughts on the Future."
 - Retrospect."

Proceedings of the Society

The Place of the Technologist in our Industry

F. L. GOODALL

Meeting of the Summer School held in Loughborough College on 30th August 1952, Mr. H. H. Bowen, President of the Society, in the chair

Since this Summer School is held under the auspices of the Society, the industry must be that served by the Society. In the terms of the Society's most recently announced objects, "our industry" may be described as the practice of the tinctorial arts, and this phrase can include the manufacture of the tinctorial substances and all the materials to which they are applied.

Each of these two broad subdivisions can contain further smaller subclassifications which rank for the description of industries in their own right. regards the manufacture of colouring matters, it is usual to subdivide this into the manufacture of dyes on the one hand and pigments on the other, although the phrase "dyestuffs industry" by and large covers the whole manufacturing and sales organisation relating to the supply of colouring matters for any purpose. There are much more marked and decided differences in the industries relating to the materials to be coloured, e.g. the textile, leather, plastics, paint, printing industries, and even these general classifications can be split up further into still smaller classifications, still dignified by the name "industries", such as the cotton industry, the woollen industry, the worsted industry, etc. The dyestuffs industry may thus, in its broadest sense, be regarded as a horizontal organisation geared to supply colour suitable for application to a number of widely different materials, each of which is represented by a vertical industry, in the sense that a particular material is processed from the raw state to a finished article which can be sold in the shops, and which at some stage in manufacture it is necessary to colour. Whilst "our industry" to any member of the Society of Dyers and Colourists therefore necessitates an interest in the manufacture and properties of dyes, it should equally embrace the application of dyes to all forms of materials. At the Society's inception it was closely allied to the textile industry and has remained so ever since, and from the nature of the syllabus of the present Summer School it is quite evident that the organisers, in visualising their programme, have regarded the field of application of dyes to be purely textile. Whilst I propose to confine myself to this restricted view of the industry which the Society serves, I cannot let the occasion pass without expressing my regret that there should exist this widespread misconception that, as regards application, the Society's only interests are in the textile field. It is unfortunately true that the Society's membership is principally drawn from textile organisations, and it has always had a strong textile bias, but I am convinced that the interests of the Society are very ill served by this restriction in its outlook.

What, then, is the fundamental purpose of "our industry"? I think the answer to this question can be summed up in two words, viz. eye appeal. "Eye appeal" is not, however, confined to textiles; its provision is certainly the main object of the dyestuffs industry, and lends itself in the hands of a successful painter and decorator, or other expert in a particular field, to attractive ensembles. In the hands of most women, aided by the cosmetics industry, which the dyestuffs industry also serves, it can provide an appeal which is usually characterised by a word other than "eye". In the textile industry, "eye appeal" is a matter for competent textile designers, for whom it is our duty as members of the industry to supply the requisite tools and materials in the shape of dyes and dyed goods. and to ensure that by virtue of their fastness properties, the tools supplied do not become blunt nor the materials unserviceable, as a result of failure in either processing or wear. The business of supplying dyes and of successfully applying them, to provide the designer's working media, is nowadays highly complex, and has, through force of economic circumstances, been divided into two groups, one of which provides and the other applies the dyes. A hundred years ago this was not the case, and it could then have been said with some degree of truth that, given the supply of certain natural materials such as logwood, camwood, etc. and a few simple chemicals, the textile dyer was responsible not only for the application of the dye, but also for the provision of the dye itself, at least in a form in which he could apply it. With an elementary knowledge of organic chemistry, it is not to-day a difficult matter to provide a dve. nor is it intrinsically difficult to apply a dye to any given material for which it is suitable. matters become complex when the enthusiastic chemist has to provide a dye of a particular hue and fastness properties, the equally enthusiastic dyer has to produce an exact match to a specified shade which will withstand various conditions of processing and use and which is level from end to end or from inside to outside of the batch, and both enthusiasts have to produce these results in the most economical way. The business of the industry thus becomes one of specialists, broadly divided into specialists in dye manufacture and specialists in dve application. These divisions are naturally subdivided almost ad infinitum, but for our immediate purposes the broad division will suffice.

The point which I wish to make at this stage is that, without the closest co-operation between the specialists whose duty it is to manufacture dyes and those whose business is their application, neither side of the industry can make progress. It is

indeed true to say that the present position of the dye-making and dye-using industry is due not only to the individual brilliance of a number of such specialists, but very largely indeed to the close co-operation between dye-maker and dye-user which has existed for nearly a hundred years. In discussing such matters, we are always faced with the problem of the chicken and the egg, but if we assume that a new dye comes first, the potential users of that dye must be consulted as to the possibility of its use, and whether or not its application offers difficulties of a practical or economic nature. Similarly, the incentive for production of a new dye arises from an indication from the using side of the business that a dye of certain properties is necessary for some special purpose. Co-operation on these matters is the life-blood of the industry. and particularly of the dyestuffs industry. Where facilities do not exist for frank discussion of a user's difficulties, and if necessary for a practical demonstration, the dye-maker is crippled from the start in his efforts to supply the correct answer. This state of affairs has arisen in an acute form in recent years in countries of the Soviet bloc, where suppliers of dyes deal with a government official who places orders but permits no discussion of problems with individual nationalised works or personnel. If the same system were to operate in the Western countries there would be little hope for development in the dyestuffs industry, and consequently in the dye-using industry. Wherever, on the plea of security, governments or lesser organisations stifle interchange of technical information between supplier and user, they slow down development to an extent proportionate to their size, and in the case of governments they prevent development completely in a particular country. Since such governments and organisations fortunately cannot prevent free countries or organisations from interchanging information, it follows that any development which takes place is a result of free interchange, and in this sense the security-minded government or organisation can be said to live on the charity of its freer-minded neighbours, behind whom, however, its own development inevitably lag.

So far in this talk I have avoided using words such as technical, technician, technology, and technologist, but as I have to talk about the last, it is advisable to enquire what a technologist is. Strictly speaking, the word implies one who has a knowledge of technique, i.e. a knowledge of how to do things or how to get things done, and this is, perhaps, as good a definition as any. Certainly, if there were such people as technologists in our industry in the early part of the nineteenth century, that general description would be ample, and would cover the art and craft of textile manufacture as it was then practised. In more recent times, however, every industry has become based more and more on scientific knowledge, and technology and technologists are becoming much more closely related to science and scientists, to such an extent that it is often difficult to differentiate the two groups. Science consists of knowledge as to why things happen, how they happen, and how they can be

made to happen. All these things have an interest for the pure scientist, with emphasis on one or more according to the individual. A technologist has precisely the same interests as a scientist, but in his hands the main interest and object of his life is how things can be made to happen on a commercial scale. In this sense I use the word commercial as indicating not only the magnitude of the technologist's activities, but also that these activities, in some distinction from those of the scientist, have necessarily to be governed to a very large extent by economic considerations. modern practice, therefore, technology has become applied science, and a technologist is one who practises the application of science to commercial ends. In such a description there is an implicit requirement that a technologist must have a scientific background. Technologists in any industry fall into three main classes-practising, consultant, and teaching. All are important, but naturally, the greatest number comprises those who practise technology.

In our industry as a whole, including the manufacture of dyes and their application to textile materials, technologists can cover an amazingly wide field, of which perhaps the most extreme examples are the technologist who designs a plant for the manufacture of a particular chemical and his counterpart who designs a machine for processing a textile. Between these two extremes, which have little in common, there exist all sorts of experts in the manufacture of special types of dyes or of textiles, and the two halves of the industry, the dye-making and the dye-using, meet on common ground when we come to consider technologists who are interested in dye application. All the big dye firms employ such technologists in order to advise their customers on the best use of their products and, of equal importance as regards development, to keep their employers informed of any new requirements of the textile industries with which they are connected.

Employment of technologists skilled in dye application is, of course, a sine qua non in textile industries, for without such experts textile products cannot be dyed and finished efficiently and economically. The main purpose of such technologists is production, which it is their first object to maintain and their second object to improve. Both of these objects are achieved by applying their own knowledge of the products which they handle, which in the case of the representative of a dyemaker is usually more specifically directed towards properties of the dye, whilst the textile technologist may have a greater knowledge of the properties of the textile than of dyes. A marriage of the respective abilities of both is usually of inestimable value in solving any technical problem of quality production at an economic price. The dye technologist in this relationship has something of the character of a consultant, and when taken into a dye-user's confidence on any problem he must observe the ethics of consultants in any sphere and respect the confidence which has been placed in

As a consultant, the dye technologist has relatively little to do with the mechanism by which his counterpart, the actual dye-user, produces his results, but the practising technologist, faced with the necessity of maintaining production hour after hour, day after day, must have a close familiarity with, and a great capacity for handling, machines, materials, and, not least, the men and sometimes women who carry out the detailed and routine operations of production. This last aspect of the practising technologist's work is sometimes overlooked, perhaps because it is incapable of measurement by any generally recognised standard. There are academic and other qualifications by which a man's suitability to practise technology can be assessed in the sense of knowing what to do and how to do it to achieve a particular result, but there are no recognised qualifications for the technologist who is particularly skilled in producing satisfactory and economic work as a result of ability in handling human relationships, which are of such vital importance in industry as a whole.

In maintaining production, a practising technologist is faced with day-to-day problems arising from variations in the materials which he is required to process and the materials with which the processing is to be done. In simply maintaining production, the chief outlet for individual brilliance in a technologist is his capacity for overcoming such difficulties. These can often be solved, and usually have to be solved at short notice, by a combination of experience and individual ingenuity and adaptability. These same factors are still of considerable value if the problem is one of improving production as regards either rate or quality, but startling developments in technology cannot be expected on the basis of these factors alone. It is usually essential for a technologist desiring to effect a radical improvement in his own works to build not only on his own experience but also on that of others, which may be available to him in published works of one sort or another or by personal contact with some individual who can give specialised information. Unless the technologist is a member of a very large firm, he has not at his disposal such facilities as a library for consultation, an information service, an abstracting service, or the opportunity of consultation with well informed colleagues, and he has to rely in the great majority of cases on information and personal contact which he can obtain for himself. It is precisely in this direction that a society such as ours offers the greatest benefit to the practising technologist. Not only does it provide a Journal which is recognised throughout the world as the best of its kind, and can always supply either the desired information or an indication of where it may be found, but by its meetings and lectures it provides an opportunity for personal contact with those individuals possessing the desired specialised experience and information.

This no doubt sounds, and indeed is, a good argument for membership of the Society, but many practising technologists, whilst admitting the general argument, will complain that it is glib and superficial because it neglects one very vital factor,

viz. whether the technologist can understand the matter placed at his disposal. Time after time the complaint has been raised by the practical technologist that he finds it difficult or impossible to understand the papers appearing in our Journal or in similar scientific publications. It is, perhaps, easy to say that such complaints are confessions of weakness as regards training and mental ability on the part of those who make them, and it is unfortunate that our scientific friends all too often dismiss the complaint on some such grounds. There must be some truth in what scientists say, and there is a real need for improvement of the general standard of scientific training of technologists, leading to better understanding of their scientific friends. But there is at least equal ground for argument that our scientific colleagues should also go to some trouble to make their contributions to knowledge intelligible to a wider circle, so that they may more easily be put to practical use. In some ways the lectures of the Society meet this need, and they meet it especially well when the local secretary has the good fortune or the wit to select as a lecturer a scientist of repute who realises that his audience cannot necessarily take full advantage of his lecture unless it is couched in familiar terms. scientists have the gift of explaining difficult theoretical concepts in simple language: I can mention four in my own experience-Astbury, Speakman, Baly, and, in my view head and shoul-ders above all others, Clibbens of the Shirley Institute, who, lecturing at a school such as this in Manchester, gave me a clearer idea of the meaning of hydrogen bonding in five minutes than had several hours of study of published literature. There are other distinguished scientists who do not possess the gift but have the intelligence to realise the necessity for simple language and take some trouble to achieve it, and to them great honour is due for the efforts which they make on behalf of their technological colleagues, whose knowledge is necessarily less specialised, but may be much wider. It is regrettably true, however, that the vast majority of pure scientists prefer to live in a world of specialised knowledge and specialised terminology, and to look down with some condescension on those people whose business it is to apply science to the production of goods and to the provision of a world suitable and comfortable enough for scientists and others to live and work Such an attitude is not only sheer intellectual snobbery, but in the large view is antagonistic to rapid social development, and certainly in the narrower nationalistic view leads to a scattering throughout the world of fundamental scientific knowledge, which other countries, under present conditions, are quicker than ourselves to turn into manufacturing realities. In our own field, one has but to mention Terylene, which resulted from purely British research and the development of which in the U.S.A. is now far ahead of this country.

Scientifically based though the work of the technologist undoubtedly is, there is now developing in this country too wide a gap between pure and applied scientists. The gap can be narrowed by a

serious attempt to improve still further the scientific understanding of technologists as a class, or it can be bridged by the encouragement of a new class of people who might be described as interpreters of pure science. In this connection, trade journals fulfil a very useful function. Both of these ideas are admirable in themselves, but my personal view is that the most rapid results could be got by the pure scientist as often as possible putting his findings into plainer and more intelligible language.

The Fellowship of the Royal Society is the highest honour which the average pure scientist can expect to receive, and some recipients of, and aspirants to, this honour tend to forget the emphasis which Charles II laid on what is now called technology in granting its first Royal Charter on 15th July 1662. In this document, His Majesty refers to his intention to extend "the very arts and sciences" and later goes on to refer to "the President, Council and Fellows of the Royal Society whose studies are to be applied to further promoting by the authority of experiments, the sciences of natural things and of useful arts". What better description could one have of technology than this one, nearly 300 years old, as a "science of useful arts"? One can understand and sympathise with the scientist who, as some describe it, "pursues knowledge for its own sake", but science has a greater duty to the world than simply the satisfaction of the individual scientist's inner craving for knowledge and understanding. It is, indeed, the duty of science not only to seek knowledge, but to do its best to ensure that knowledge is put to practical use for the benefit of mankind as a whole. There is too much of the attitude on the part of pure science: "here is the knowledge, but you must learn to understand and apply it", when the attitude should be: "here is the knowledge in simple terms, and it may possibly be of practical use in this or that problem"

In the 1952 Messel Memorial Lecture 1, entitled "The Strategy of Science", the general burden of Sir Henry Tizard's argument is that there is a very great need, particularly in this country, for modification of research plans to ensure that they produce practical results. He quotes an American, Dr. Meier², as emphasising the relative lack in Britain of men who are engaged in the application of research, and concluding that in present circumstances British fundamental research works to the detriment of the trade balance between the sterling and the hard-currency areas. Sir Henry agrees with Dr. Meier in suggesting that we have paid far too much attention until recently to the need for fundamental research in industry, and far too little to the need for development and skilled application of what is already known. Fundamental research, he says, "may indeed be necessary to reach a definite technical end, but the end must justify the means". Sir Henry refers also to a remark by Sir Ewart Smith that "any basic knowledge which is evolved is, broadly and relatively, quickly available to all, and it is, therefore, upon technological skill in application that the progress of industry, and consequently the economic position of the nation, can mainly depend.'

Sir Henry concludes his lecture by summarising his own convictions in the following words: "It is more important now to strengthen our technology than to expand our science; more important to do things than to write about how they might be done. Science is not enough."

Although I consider that Sir Henry Tizard's paper is the most interesting and informative of any which I have seen on the subject of science and technology in recent years, he is not alone in taking a serious view of the divergence between pure science and technology and of the serious economic consequences which may result from it. Indeed, the matter was debated in the House of Lords on 11th and 12th June 1952, and in the course of the debate Lord Woolton stated the Government's views on the matter, which were simultaneously announced by the Chancellor of the Exchequer in the House of Commons.

The statement begins: "The Government consider that a most important means of increasing productivity in industry is to improve facilities for higher technological education. They are convinced that this can best be done by building up at least one institution of University rank devoted predominantly to the teaching and study of the various forms of technology." Whilst no thinking man can seriously disagree with the Government view of the necessity for improved facilities for higher technological education, I am myself convinced that this is only one approach to the problem of narrowing the gap between the scientist and the technologist, and whilst important in itself will necessarily take a very long time to show practical effects. As I have said earlier in this talk, quicker results would be obtained by a crusade to persuade pure scientists to abandon their pedestals of intellectual snobbery and take individual and positive steps to ensure the fruits of their researches reaching technologists in a comprehensible and digestible form. Admittedly, technologists need educating to as high a level as is humanly possible, but similarly, some pure scientists need education in the broader aspects of life and industry, and of how things tick.

To those of us who have to confine our reading to the events of the day and such scientific and technical matter as is of immediate interest, it may come as rather a surprise to hear of the importance laid in high places on technology and technologists. This importance is no greater than is deserved, but I do not think that we should consequently go about the world feeling that technologists are the salt of the earth. We are, after all, human, and because of our frailty there is some need for a code of behaviour, which I venture to put forward with all humility. It arises out of seeking to find the answers to the following questions: What should be the attitude of the technologist to his job, his commercial competitors, science, labour, and his fellowmen in general?

To the true technologist, his job—this business of maintaining and improving production—should be the one absorbing passion of his working life. He should like it for its own sake and not for what he gets out of it in terms of money and personal

A technologist is not born but made-made by the man himself, working with his own native abilities, aided by his own experience and study. However successful he may be, and however hard he may have worked himself, let him never forget that his success is founded in some degree on the work of others-colleagues, tutors, advisers of all kinds, and even the humble shareholder, whose willingness to venture his capital in founding a business may have given him the opportunity to work at all. Let him never fail to acknowledge the help he has received, and be as ready to give

help out of the bounty of his success as in his own struggling days he was anxious to receive it.

Finally, let him never blame his tools for lack of success. The success of a works, a plant, an office, or a laboratory does not depend on its equipment but on the people working in it. It is the people who count and the first person you can influence is yourself. Let us hope you will not be found wanting.

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COMMUNICATIONS

Quantitative Analysis of Azo and other Dyes and Intermediates

F. M. ARSHID, N. F. DESAI, C. H. GILES, and G. K. McLINTOCK

An oxidative method of semi-micro analysis suitable for nitrogen in dyes is described. The results with a representative number of different types of azo dye and some members of other classes agree closely, for the majority of the dyes examined, with those obtained by titanous chloride analysis, and the new method has the advantage of being simple, rapid, and clean in use. The procedure involves measurement of the volume of nitrogen produced on boiling the dye with a dilute solution of potassium dichromate and sulphuric acid.

A still simpler, colorimetric method of determining water-soluble azo dyes uses ceric sulphate oxida-

. It is useful for some dyes, but many do not react in simple proportion with the oxidant.

A colorimetric method for the determination of the purity of coupling components for azo dyes is also described. This procedure is simpler than the usual method of diazo titration.

Introduction

Colorimetric analysis of dye solutions is now widely practised, but it is capable only of giving the strength of one sample of dye relative to some standard sample of the same material. If the absolute purity is required, a chemical analysis must be made on the sample or the standard. Such analyses are required very frequently in technical practice and for research purposes. The direct colorimetric analysis of unknown samples against purified specimens is, however, seldom practicable with water-soluble dyes, because of the great difficulty of purifying them to a sufficient degree for comparison. A simple and accurate analytical method for determining the purity of dyes, especially of water-soluble types, is, therefore, of some general interest.

TITANOUS SALT ANALYSIS

The standard analytical method for watersoluble azo dyes is the well known reduction process using titanous salt solutions, first proposed by This method is suitable for almost all water-soluble azo dyes and for some dyes of other water-soluble classes, as well as for certain intermediates, e.g. nitro and nitroso compounds. Though the results obtained by this method are usually reliable, there are a number of objections to its use, including-

(a) The instability of the solutions of titanous chloride or sulphate employed, which necessitates the use of a somewhat complicated apparatus to prevent contact of the reagent with air. Even so, the strength of the reducing solution must be

checked daily against a standard oxidising solution (usually ferric ammonium alum).

- (b) The necessity for carrying out the titration at the boil.
- (c) The need to use a dye solution containing 2 N. hydrochloric acid when titanous chloride is the titrant. This causes the evolution of strongly acid vapours from the boiling solution during the titration.
- (d) The uncertainty of the end-point with many dves, due to inadequate colour change or slow reduction. In some such cases it is necessary to complicate the procedure by adding excess of reducing agent, at the boil, and then to cool and back-titrate with ferric ammonium alum.

In order to avoid these inconveniences, experiments were carried out with the object of establishing a method of oxidative analysis for dyes, in which stable and readily accessible reagents could be used.

Oxidation with Potassium Dichromate and Sulphuric Acid

DYES

During the course of an investigation into the oxidation of azo compounds, Desai and Giles 9 found that it is possible to obtain quantitative yields of nitrogen from water-soluble azo dyes, not containing other nitrogen atoms, by boiling in dilute potassium dichromate-sulphuric acid solution. If groups containing nitrogen, other than the azo group, were present in the dye, only a portion of the total nitrogen was recovered.

TABLE I Analytical Data on Water-soluble Azo Dyes

C.I.	Base Dye Co	nstitution Coupling Component	Sample used			found by— Microanalysis
140.	Dane	Coupling Component				(N by combustion)
27	Aniline	2-Naphthol-6:8-disulphonic (G) acid	L.P.*	100	99-9	
28	Aniline	2-Naphthol-3:6-disulphonie (R) acid	L.P.	99	98-7	-
31	Aniline	8-Acetamido-1-naphthol- 3:6-disulphonic acid	Azo Geranine 2GS (ICI)	31	30-8	-
39	m-Nitroaniline	R acid	L.P.	113†	99.4	Nome
42	p-Nitroaniline	N-Ethyl- N - p -sulphobenzyl-aniline	Azo Cardinal G (A)	35†	36-2	35.5
(64)	p-Toluidine	R acid	L.P.‡	100	99.0	Total Control
78	(m-Xylidine)	(2-Naphthol-6-sulphonic (Schäffer's) acid)	Scarlet 2R (B)	39	37-8	-
89	a-Naphthylamine	G acid	Recryst, sample of Crystal Ponceau heptahydrate (A)	100	100-1	6-7a
119	2-Methoxy-5-methyl- aniline	1-Naphthol-3:8-disulphonic acid	Eosamine B (A)	52	51.7	-
148	Sulphanilie acid	Resorcinol	Resorcine Yellow (A)	60	59-8-	-
151	Sulphanilic acid	β -Naphthol	L.P. (crude)	61	61.3	- April 1
170	o-Aminophenol-p-sulphonic acid	1:5-Dihydroxynaphthalene	Diamond Black PV (By)	32	31.2	
176	1-Naphthylamine-4- sulphonic acid	β -Naphthol	Recryst. from Naph- thalene Red J (ICI)	100	100-1	
182	1-Naphthylamine-4- sulphonic acid	Schäffer's acid	Naphthalene Red EAS (ICI)	48	48-0	-
185	1-Naphthylamine-4- sulphonic acid	G acid	Recryst. from Naph- thalene Scarlet 4R (ICI)	85	85-4	-
266	m-Aminophenyltrimethyl- ammonium chloride	m-Toluidine, then β -naph-thol	Janus Red B (MLB)	62	62-1	
518	Dianisidine	1-Amino-8-naphthol-2:4-di- sulphonic acid (28 acid),	Chlorazol Sky Blue FFS (ICI)	18	17.7	-
-	p-Anisidine	R acid	L.P.	89-5	90-1	-
-	m-Chloroaniline	R acid	L.P.	68	67.8	
2029	p-Chloroaniline	R acid	L.P.‡	99	100.0	
-	NN-Dimethyl- p - phenylenediamine	R acid	L.P.	52-5	52.1	
(MINK)	p-Nitroaniline	R acid	L.P.	88†	88.5	
-	p-Phenetidine	R acid	L.P.	73	71.9	-
-	Benzidine	(R acid) ₂	L.P.	41.5	40-8	

· Laboratory preparation.

† Assuming the nitro group is not reduced.

‡ Purified by one passage through an ion-exchange (anionic and cationic) resin column.

The method requires no elaborate apparatus, and it was later decided to attempt to modify it to make it more widely applicable. It has now been found possible, by employing rather more severe oxidative treatment and working on a smaller scale, to use the method for the determination of almost all types of azo dye, including those containing nitrogen in groups other than the azo group, and for certain other classes of dye as well.

The new method is simple and of good accuracy; and in many cases a result can be obtained in a few minutes. It employs common reagents which require no standardisation, and the apparatus (Fig. 3) is inexpensive, robust, and readily assembled.

In order to explore thoroughly the suitability of the method for general use, a number of representative dyes were selected and analysed both by the new method and by means of titanous chloride. In a few cases where the latter was unsuitable or gave doubtful results, microanalysis by com-

bustion was used as a check. The samples used included old and new commercial products, laboratory preparations, both crude and purified, and material obtained by recrystallising commercial dyes. The results are summarised in Tables I and II, from which the following general conclusions regarding the applicability of the new method may be drawn-

(a) It appears to be suitable for all hydroxyazo dyes, whether water-soluble or water-insoluble, and for azo dyes without hydroxy groups if sulphonic acid groups are present. It is not suitable for unsulphonated azo dyes without hydroxy groups; this class is, however, of very little importance *.

(b) It can be used successfully with methylene blue and some triphenylmethane and anthraquinone dyes, although insufficient examples have

• It has e.g. only seventeen representatives amongst the 639 azo dyes listed in the Colour Index. Some of the water-insoluble disperse dyes for cellulose acetate (not included in the Colour Index) are, however, of this type, but their direct colorimetric determination is usually possible against pure samples readily obtained by solvent extraction and recrystallisation.

TABLE II

		Analytical Data on Mi	scellaneous Dyes				
C.I. No.	Type and or Constitution of Dye		Sample used	Purity (%) for TiCl ₃ K ₂ Cr ₂ O ₇ !			
	Base	Coupling Component(s)				combustion)	
WATE	R-INSOLUBLE HYDROXYAZO	Dyes					
24	Aniline	β-Naphthol	L.P. (recryst.)	99	99-4		
38	m-Nitroaniline	β-Naphthol	L.P. (recryst.)	96	96-4	Service Control	
	m-Chloroaniline	β-Naphthol	L.P. (recryst.)		99-1		
	p-Chloroaniline	β-Naphthol	L.P. (recryst.)	9	100	-	
	NN-dimethyl-p-phenylene- diamine	β -Naphthol	L.P. (recryst.)	72	73-0	-	
	p-Phenetidine	β -Naphthol	L.P. (recryst.)	98	97-7		
-	p-Toluidine	β -Naphthol	L.P. (recryst.)	96.5	94-7		
A20 C	COMPOUNDS WITHOUT HYDRO	XY GROUPS					
	Azobenzene	AL UNIOTO	Pure recryst.	-	16		
15	Aminoazobenzene	_	Pure recryst.		25		
-	4-Nitro-4'-N-phenylaminoa	zobenzene	Dispersol Fast Orange A (ICI) 10 (recryst.)		28		
21	Aniline	m-Toluylenediamine	Chrysoidine RL (B)	90*	19		
143	Sulphanilic acid	Diphenylamine	Recryst. commercial product	97	96-9	-	
147	Na 4'-N-(2:4-dinitrophenyl sulphonate	aminoazobenzene-4-	Azo Flavine FF (B)	(65)†	50-5	52.5	
370	Benzidine	(1-Naphthylamine-4- sulphonic acid) ₂	Congo Red WS (ICI)	56-5	56-7	-	
495	Dianisidine	(1-Naphthylamine-4- sulphonic acid) ₃	Benzopurpurine 10B8 (ICI)	35	35-1	35-5	
SULPH	ONATED TRIPHENYLMETHAN	e Class					
	Na salt of 4-sulpho-4':4"-b benzylamino)triphenylm	pis(N-ethyl-N-p-sulpho-	Lissamine Green SFS (ICI)	73.5	74.8	-	
735	Na salt of bis-p-dimethyla naphthylmethyl		Lissamine Green VS (ICI)	65.5	66-9	***************************************	
AZINE	CLASS						
841	3:7-Diamino-2:8-dimethyl-5 phenazinium chloride	-phenyl(or o-tolyl)-	Safranine		:		
THIAZI	INE CLASS						
922	3:7-Bisdimethylaminophena	zathionium zine chloride	Methylene Blue 2BS (ICI)	47]]	47-3		
924	3:7-Bisdimethylamino-4-nit chloride	rophenazathionium zinc	Methylene Green		‡	-	
ANTHE	AQUINONE CLASS						
1054	Sodium 1:5-diamino-4:8-dil disulphonate	nydroxyanthraquinone-3:7-	Alizarin Sapphire Blue B (CAC)		60-1	57-5	
1076		methyl-4-o-sulpho-p-methyl-	Solway Blue RNS		50.0	51.0	
	Sodium 1:4-diaminoanthrac	quinone-2-sulphonate	L.P.		54.5	52.5	

Several dyes of the Vat and Cyanine classes and an anthraquinonoid Disperse dye all gave very low yields of nitrogen.

• Titanous chloride in these cases gave abnormally high analytical figures.

† Partial reduction of the nitro groups takes place with TiCl₃, and the purity value obtained (based on no reduction of nitro groups) is unreliable.

! Very low yield of nitrogen.

|| Calculated as pure dye.

been examined to determine whether it is as widely applicable to other classes as it is to azo dyes.

(c) It appears to be unsuitable for cyanine, vat, and water-insoluble anthraquinone dyes.

A particular difficulty, met in examining the suitability of the new method for use with dyes other than those of the azo class, is that the titanous chloride method cannot be satisfactorily employed for many of them, and the microanalytical figures for nitrogen are not always sufficiently precise for giving purity data, so that no suitable standard of comparison is available by which to check the results. Nevertheless, for

this very reason, we consider that the suitability of the new method for the assessment of purity of most nitrogen-containing water-soluble dyes is of interest.

We have been unable to trace any published record of the use of titanous salt analysis for either (i) nitroazo dyes or (ii) water-insoluble azo dyes. Our present tests show that (i) give doubtful results in some cases with titanous chloride, owing no doubt to partial reduction of the nitro group; in several examples, no reduction of this group appeared to take place. The dichromate oxidation method gives yields corresponding to the

total nitrogen, including that of the nitro group. We find that the water-insoluble azo dyes can be determined quite readily in glacial acetic acid solution by means of titanous salts or by the new method, and the results by the two methods are in agreement.

INTERMEDIATES

The present method was tested on the following intermediates—acetanilide, p-anisidine hydrochloride, diphenylamine, H acid, p-nitroaniline, 2-nitronaphthalene-4:8-disulphonic acid. In all cases very low yields of nitrogen (3-15% of theoretical) were obtained. There is little structural resemblance between these compounds, and it is difficult to explain why as a class they do not decompose readily, while many dyes, of equally varied structures, give quantitative yields of nitrogen. A possible generalisation applicable here is that coloured compounds, viz. dyes, decompose quantitatively, whereas uncoloured intermediates do not. It would then appear that the ease of release of nitrogen is related to the structural characteristics conferring colour on the molecule.

PRECISION

Series of up to ten replications of analyses of dyes which decompose rapidly gave standard deviations of about 0·3.

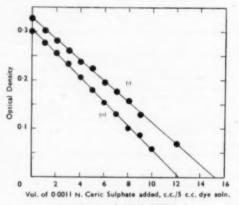
REACTION MECHANISM

No further investigations have been carried out to elucidate the reaction mechanism of this oxidation process, but it may be mentioned that the original trial of the method was based upon the supposition that, in the case of the hydroxyazo dyes, the quinone hydrazone tautomer is preferentially attacked, and disruption first occurs of a C=N bond adjacent to the aromatic nucleus containing the hydroxy group, leading to formation of a diazonium salt, which then loses nitrogen 9. This is supported by the fact that, in the present method, the nitrogen in the azo group appears to be given off more rapidly than that in other groups in the molecule. After this group has decomposed, a general break-up of the disruption products must occur. It has now been noticed that o-hydroxyazo compounds decompose more rapidly than the para isomers in the present procedure. This agrees with suggestions made by previous workers that the former exist largely as quinone hydrazones and the latter as the azo tautomers e.g.11. Azo compounds containing neither hydroxy nor sulphonic acid groups must decompose in a different manner from hydroxyazo compounds, because they give low yields of nitrogen, not even corresponding to the azo group alone.

Absorptiometric Analysis of Azo Dyes using Ceric Sulphate as Oxidant

Ceric sulphate is a stable, clean, and convenient oxidising agent ¹², ¹³. It was found that solutions of many azo dyes are instantaneously decolorised by it in the cold. A number of experiments were therefore carried out to discover whether it could be used as a general analytical reagent for azo dyes.

It has already been reported 9 that volumetric and potentiometric analysis of Orange II with ceric sulphate does not give reliable results. Attention was therefore directed to the use of the absorptiometer in assessing the decomposition of dyes by this reagent, and a simple analytical method suitable for routine analysis was worked out. Briefly, the method is to add increasing quantities of 0.001 N. ceric sulphate solution, acidified with sulphuric acid, to a series of aliquots of a dye solution, a suitable strength for the latter being 0.05-0.1%. The solutions are then allowed to stand at room temperature for 10 min. to ensure completion of the reaction, and are afterwards suitably diluted for optical density determination. A graph is then plotted of optical density against quantity of reagent added. With increase in the amount of oxidising agent, the depth of colour of the solution progressively decreases (ceric sulphate itself is pale yellow), and the graph, which is linear, may be readily extrapolated to zero optical density. The intercept on the x-axis should correspond to quantitative oxidation of the dye (Fig. 1).



- (i) Naphthalene Red EAS (0-082% soln.)
- (ii) Azo Geranine 2GS (0-103% soln.)

Fig. 1

The decomposition of Orange II by ceric sulphate in presence of sulphuric acid was assumed by Desai and Giles ⁹ to be represented by the equation*—

• Shorter and Hinshelwood ¹⁴ find that oxidation of acetone by ceric sulphate involves transfer of electrons from the organic compound to the oxidising agent. They suggest that the end form is attacked and successively hydroxylated. Jones and Soper ¹⁸ found that the active compound in acid ceric sulphate solutions is H₃Cc(SO₄)₂OH, which lonises as an acid.

Unfortunately less than half the azo dyes examined have been found to give results approximately corresponding to this equation, as shown by Table III, which summarises the experimental data obtained with a range of representative azo dyes.

TABLE III
Ceric Sulphate Oxidation of Azo Dyes

C.I. No.	Dye			Oxygen required * ol./mol. dye
-	Aniline I - Naphthol - 5-su	lphor	ic	
	acid		0 0 0	0.8
-	o-Anisidine→R acid	000		1.05
-	m-Chloroaniline→R acid		0.00	1.1
-	p-Chloroaniline→R acid		0.00	1-1
	p-Nitroaniline→R acid			0.8
31	Azo Geranine 2G			1.0
57	Amidonaphthol Red 6B			1.25
(64)	p-Toluidine→R acid			1.0
(108)	Cr complex of Picramic	acid-	>	
	Naphthionic acid			0.35
119	Eosamine B	000	000	1-6
126	Erika 2GN	0 0 0		1.05
148	Resorcine Yellow	000	0 0 0	155
151	Orange II			1.0
170	Diamond Black PV			1-1 (?)†
176	Naphthalene Red J			0.8
182	Naphthalene Red EA			1.0
185	Naphthalene Scarlet 4R			1.2
262	Cloth Red BO (GrE)			1.2
289	Coomassie Navy Blue G			0.6
376	Congo Rubine			0.8
518	Chlorazol Sky Blue FF			0.95
640	Tartrazine NS		***	1.3
-	Chlorantine Fast Green B	LL (C	CAC)	0-8
person	Cr complex of 2-Amino- phenol - 6 - sulphonic	acid	→3-	
	Methyl-1-phenyl-5-pyr	azolo	ne	1.0

· Calculated from titanous chloride analysis data.

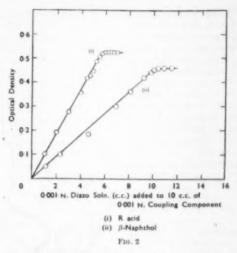
† Diamond Black PV gives a curve with an abrupt change of slope; extrapolation of the upper part of the curve gives this value.

In a few cases the dye is precipitated by addition of the acid ceric sulphate solution ‡. Various means of avoiding such precipitation were tried, e.g. employment of emulsifying agents in the aqueous solutions, or use of dioxan or pyridine as solvent, but no satisfactory results were obtained, the oxidation being prevented in such circumstances.

Colorimetric Determination of Azo Dye Coupling Components

An improved procedure has been devised for the analysis of intermediates which can be used as diazo or coupling components for azo dyes. This is based on the colorimetric method previously described ¹⁶ for determining the strength of solutions of the Naphtol AS type. The new method is simple, rapid, and less tedious than the commonly employed diazo titration procedure ¹⁷, and it has given consistent results with a number of typical intermediates.

The method involves the addition of successively increasing quantities of a diazotised solution to a series of equal aliquots of a solution of a second component, the end-point of the coupling reaction



then being readily determined by measuring the optical density of the liquids, plotting the values against the volumes of diazo solution added, and noting at which point the maximum optical density is first reached. Table IV shows some results, and in Fig. 2 are shown two typical curves.

TABLE IV

Colorimetric Determination of Ago Dye
Coupling Components

	-	Francis	 - Promote and		
Con	pour	nd	Quality	Purity (D)	(%) * (C)
a-Naphthol		***	 Recryst.	99	100.0
β -Naphthol			 Recryst.	100	100-5
I-Amino-8-naj sulphonie			 Recryst.	85	86-0
I-Amino-8-naj sulphonic			 Recryst.	63	63-5
2-Amino-8-naj sulphonic			 Recryst.	73	72-0
2-Naphthol-3: acid (R ac			 Crude commercial	59	60-0
			Recryst.	72	72-5
2-Naphthol-6: acid (G ac			 Recryst.	97	97-5
2-Naphthol-7- (F acid)			 Recryst.	70	71-5
o-Anisidide of naphthoic			 Commercia	-	97-5
o-Toluidide of naphthoic			 Commercia	97	96-3

. (D) Direct diazo titration

(C) Colorimetric titration

Discussion and Conclusions

(a) The dichromate oxidation method described appears to be suitable for all azo dyes except the small number which contain neither a sulphonic acid group nor a hydroxy group, and also for some nitrogen-containing dyes of other classes, e.g. the triphenylmethane and anthraquinone classes. The method is simpler, cleaner, and in most cases more rapid than the titanous salt reduction method.

The method is unsuitable for nitrogen-containing intermediates, but many of these may be determined readily by the colorimetric method also described in this paper.

[‡] The presence of acid is necessary in ceric sulphate oxidation to avoid precipitation of basic salts.

(b) The ceric sulphate oxidation method is the simplest analytical procedure known to us for azo dyes, and it could conveniently be employed where a large number of routine purity determinations are required. Many dyes, however, do not react in simple stoichiometric proportion with the reagent, and unless improvements can be effected by future research, it will be necessary to have previously deter-mined data available upon the required molar proportion of oxidant, e.g. as given in Table III.

(c) The colorimetric method described for azo dye coupling components is simple, rapid, and

reliable, and is an improvement on the diazo titration procedure. It appears to be applicable to any second component, and while only compounds of this class have been studied in the present investigation, this method should clearly be of equal value in determining bases in the form of their diazotised solutions.

ERRORS DUE TO NITROGEN-CONTAINING IMPURITIES

The oxidative procedure cannot, of course, be expected to give reliable results if nitrogencontaining impurities, e.g. uncoupled diazo compound or its decomposition products, are present in the dye sample. The presence of such substances is believed to account for abnormally high nitrogen yields obtained from some laboratory preparations of azo dyes in the crude state, e.g. some dyes prepared from chloroanilines. After recrystallisation the analyses by dichromate and titanous chloride were in agreement. Thus, if there is any reason to suspect the presence of impurities of this type, it may still be necessary to analyse by titanous chloride as well as by dichromate. If the two methods are in agreement, it is probable that the true value has been found. If they are not, neither method can be entirely reliable, because some of the impurities in question, e.g. diazo compounds, also react with titanous salts. Possibly in certain of these cases the ceric sulphate method could be used as a check.

Experimental

APPARATUS FOR NITROGEN DETERMINATION

The apparatus is shown in Fig. 3. F is a 50-c.c. round-bottomed flask heated by a Bunsen burner; C a small Liebig condenser approx. 7 in. long overall; N a 1-5-c.c. micronitrometer (Schiff's pattern); and D is a 250-c.c. Dewar flask containing solid earbon dioxide and fitted with a mercury safety valve M. The nitrometer is filled with 50%

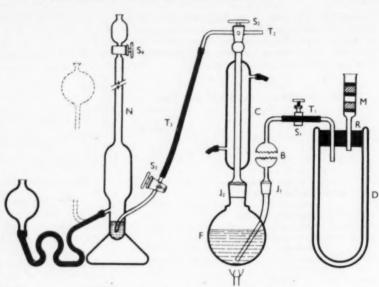


Fig. 3 - Apparatus for Nitrogen Determination

(by weight) aqueous potassium hydroxide containing barium hydroxide (l g. per 100 g. of potassium hydroxide) to prevent frothing 18a by removing traces of carbonate particles *.

The glass lead-in tube and the condenser are connected to the reaction flask F by means of standard ground-glass joints, J_1 , J_2 (in the present apparatus these are of B 7 and B 10 designation respectively); S_3 , S_4 are the glass stopcocks \dagger of the nitrometer, S_3 being a three-way cock with one exit to the atmosphere. S_2 is a three-way glass stopcock \dagger ; when this is in one position the flask is connected with the nitrometer; when it is in the other position the flask is connected either to the atmosphere or to a vacuum pump through the short glass side-arm T_2 ; B is a bulb of sufficient capacity to prevent sucking-back of the liquid into D; T_1 and T_2 are rubber connecting tubes. The carbon dioxide supply is regulated by a screw-clip \dagger S_2 : B_1 is a rubber bung.

 S_1 ; R is a rubber bung. The mercury valve M is of the usual construction, as shown, with a fused-in sintered glass disc at the bottom, having layers placed upon it in the following order—1 cm. of mercury, then an air space (2–3 cm.), a plug of tightly packed cotton wool, a layer of intimately mixed charcoal and iodine, and finally another plug of cotton wool ^{18b}. This valve both regulates the maximum pressure of carbon dioxide (which may be increased if desired by increasing the thickness of the mercury layer) and prevents the escape of mercury vapour into the atmosphere.

To perform an analysis, the order of procedure is as follows—

(i) Charge D with solid carbon dioxide, by gently ramming down the finely powdered material

 The liquid is allowed to stand several days before use, and the traces of solid carbonate which have settled to the bottom are removed by decantation.

by decantation.
† Good results have been obtained with a clip and stopcocks of normal pattern, but long-handled precision stopcocks of the type recommended by the American Specification Committee ¹⁹ would give a more critical control of gas flow.

until the vessel is filled to capacity. Insert the bung, and allow excess gas to escape to the atmosphere through the mercury valve for 2 hr. before use. This ensures an air-free supply.

(ii) In F place 5 c.c. of 5 N. sulphuric acid, 5 c.c. of 10% (wt./vol.) potassium dichromate solution, and a suitable amount of dye solution* (usually 2–10 c.c. of 0.01% solution) to produce ca. 1 c.c. of nitrogen.

(iii) Sweep out the apparatus with carbon dioxide until free from air, as follows—With the nitrometer reservoir in the lowered position and S_4 closed, open S_3 to the air and turn S_2 to connect C with S_3 . Open S_1 fully and pass a steady stream of gas for 5 min., then open S_4 and raise the reservoir to fill N with the potassium hydroxide solution. Close S_4 , lower the reservoir, open S_3 to N, and pass a slow stream of carbon dioxide again, observing whether all the air has been removed by noting the size and velocity of the bubbles rising in N.

(iv) Begin oxidation by boiling the centents of F, a very slow stream of gas being passed to prevent sucking-back of the liquid †.

(v) When exidation is complete, which is shown by the diminution in size of the gas bubbles in N almost to vanishing point, increase the carbon dioxide flow for 1 min. to complete the collection of nitrogen; then remove the burner, close S_3 , open S_2 to the atmosphere, and read the volume of gas in N after allowing it to stand 15 min. to cool to room temperature.

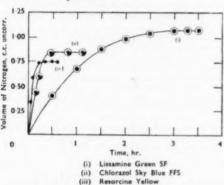


Fig. 4— Rate of Nitrogen Evolution

It is advisable to plot a rough curve showing the rate of evolution of nitrogen, by observations of the nitrometer reading at intervals during the experiment. The curve will readily indicate the time for which the analysis should be continued. In Fig. 4 are reproduced typical curves showing the rate of evolution of nitrogen from various dyes.

Period of Oxidation

For specifying the length of time required to complete the oxidation, the soluble azo dyes may be divided roughly into three classes—

- (a) Dyes without additional nitrogen-containing
- Normally in water, but glacial acetic acid is used for water-insoluble azo dyes.
- \dagger It is advisable to open S_3 to the atmosphere for a short time while the flask is warming up, but to close it before b.p. is actually reached, in order to allow the escape of any dissolved air in the reaction liquid.

groups; these are oxidised in 10 min. (in a few cases even in 3 min.).

(b) Dyes with nitrogen-containing groups in addition to the azo group; these require a slightly longer treatment, but are completely oxidised in about 30 min. The higher the ratio of azo to amino groups, the more rapid appears to be the decomposition.

(c) Dyes which are precipitated by the oxidising solution and do not redissolve on boiling. These should be boiled for 2 hr. to complete the oxidation. Only a few examples of this class have been encountered, e.g. Congo red and benzopurpurin. (Some dyes are precipitated in the cold, but redissolve on boiling. These are included in Class (b).) The triphenylmethane and anthraquinone dyes appear to decompose slowly and may require 2-3 hr. for analysis *.

The whole procedure occupies about 30 min. with dyes in Class (a) and 50 min. with those in Class (b). The extended period required for Class (c) dyes is no great inconvenience, because the apparatus can be left without attention during the boiling process, provided the rate of flow of carbon dioxide has been correctly adjusted and is low. It is important, however, when testing these dyes, to ensure that the carbon dioxide is completely free from air, and a check should be made by passing the gas into the filled nitrometer for 15 min. before starting the experiment. No measurable volume of gas should collect.

Even if the gas supply does contain traces of impurity, a fairly reliable result can sometimes be obtained by plotting the rate of gas collection and noting the point at which the slope of the curve finally becomes constant. This represents the point at which nitrogen evolution from the dye has ceased; thereafter the gas which collects at a constant rate is impurity.

PREPARATION AND STANDARDISATION OF CERIC SULPHATE SOLUTION

Ceric sulphate is very stable, and no special precautions are necessary for storing it in solution. The technical-quality material may be used; this is readily standardised by means of potassium dichromate, using ammonium ferrous sulphate as intermediate standard with N-phenylanthranilic (diphenylamine-2-carboxylic) acid as indicator †. The 0-001 N. ceric sulphate solution is made strongly (N.) acid with sulphuric acid; 4 mol. of the salt (Ce(SO₄)₂) yield 1 mol. of oxygen.

COLORIMETRIC DETERMINATION OF AZO DYE COUPLING COMPONENTS

Purification of Intermediates—The naphthalenesulphonic acids were purified by precipitation with acid from alkaline solution, followed by recrystallisation from water; β -naphthol (m.p. 122°c.) by sublimation; and α -naphthol (m.p. 94°c.) by recrystallisation from aqueous ethanol.

[•] Many attempts were made to accelerate nitrogen evolution from dyes whose decomposition is slow, e.g. by the use of increased concentrations of acid and/or potassium dichromate, or the use of high concentrations of ferric chloride as an additional oxidising agent in order to raise the b.p. of the reaction mixture, but no success was achieved.

^{*} With dichromate as the titrant, because the indicator is effective only in presence of ferrous ions.

Some coupling components were used in the original commercial state,

Solutions are prepared as follows-

Sulphanilic Acid (0·1 n.)— Dissolve 17·32 g. of pure sulphanilic acid in boiling water (400 c.c.), adding sufficient sodium carbonate to make the solution slightly alkaline (Brilliant Yellow paper), filter hot, cool, dilute to 1000 c.c., and store in the dark.

Diazo Solution (0·001 n.)—Add 2 c.c. of concentrated hydrochloric acid to 5·0 c.c. of 0·1 n. sulphanilic acid, followed by 5·2 c.c. of 0·1 n. sodium nitrite solution. Neutralise to Congo red paper with sodium acetate, and dilute to 500 c.c. with ice-cold water.

COUPLING COMPONENT SOLUTION (0.001 N.)—The solution should contain 5 g. of sodium hydroxide per 1000 c.c. Unsulphonated naphthols are dissolved in boiling aqueous ethanol containing sodium hydroxide, and the solutions diluted with aqueous ethanol.

Method of Test

Pipette 10-c.c. portions of coupling component solution into a series of graduated flasks, of a capacity (usually 100-500 c.c.) required to give solutions having optical densities suitable for direct reading on an absorptiometer. Add successively increasing quantities of diazo solution, and allow the mixtures to stand for 30 min., to ensure complete coupling, before diluting. Use aqueous ethanol for diluting the solutions from unsulphonated coupling components. examining the solutions on the absorptiometer, read off the purity of the test sample directly from the curve of optical density against volume of diazo solution added. In the present work good results have been obtained with both a one-cell (EEL) and a two-cell (Spekker) absorptiometer.

Distilled water and analytical-quality reagents were used in the present work, except where otherwise stated. Microanalyses for nitrogen were by Dr. A. C. Syme (Glasgow) and Drs. Weiler and Strauss (Oxford).

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The Influence of Particle Size on the Dyeing Properties of Vat Dyes

T. FLANAGAN

An attempt has been made to assess the importance of the particle size of commercial vat dyes as a factor influencing level dyeing, when using the padding technique in dyeing viscose rayon cakes. A number of dyes have been subjected to the Hampson filtration test and classified according to particle size. A similar classification has been based on filtration of dye from the padding liquor during the actual dyeing process. A fair degree of correlation between the two methods has been established. Some factors affecting the filtration properties of the vat dyes have been investigated.

The classification of dyes according to particle size has been compared with actual dyeing results. It has been found that in the case of dyes with a high rate of strike and poor levelling properties some advantage is obtained by virtue of the more level pigmentation which results from the use of dyes of small particle size. In general, however, it is concluded that particle size is not a major factor affecting the dyeing of viscose rayon cakes with vat dyes, and that a more important part is played by the migration of the leuco vat dye. This migration is promoted by dyeing at elevated temperatures, and with many dyes is influenced by the concentration of Dispersol VL.

Owing to the difficulties involved in the application of vat dyes to viscose rayon cakes by the normal direct vatting methods, stress has been laid in recent years on pigment-padding techniques. The Abbot-Cox process ¹ is typical, and since in

this method dyeing of the padded cake is supposed to take place in situ, there should be no large return of reduced dye from the cake to the dyebath. Hence the difficulties associated with direct vatting methods are eliminated.

If this theory is correct, it is necessary to pad the yarn evenly in order to obtain a level dyeing. Experience in the vat dyeing of viscose rayon cakes has shown that level pigmentation is rarely obtained, and therefore, on the basis of the Abbot-Cox process, this would appear to be one of the main contributory factors to irregular dyeing. One cause of uneven pigmentation lies in the variation in particle size of the commercial vat pastes supplied by the manufacturer, and this led Hampson 2 to carry out experiments with dye pastes which had been reground in a ball mill to reduce the particle size and break up aggregates. To compare the particle sizes of the commercial vat pastes he evolved a simple filtration test, using two thicknesses of No. 1 Whatman filter paper as the filtration material.

Dye pastes containing large particles were reground, and then applied to viscose rayon cakes using a padding process similar to the Abbot-Cox technique. Since the pigment particles were now very small, the gradual aggregation of the particles and exhaustion of the dyebath with the addition of electrolytes were now entirely under the control of the dyer. Hence level pigmentation was feasible, and therefore the possibilities of obtaining an evenly dyed cake were considerably enhanced. The concentration of electrolyte present in the exhausted padding bath when using reground dye pastes was ca. 10-20 g./litre, and since this would militate against migration at the reduction stage of the process the exhausted padding bath was discarded and a fresh bath made up for reduction.

In our investigation into the application of vat dyes to viscose rayon cakes we have tried to assess the importance of particle size as a factor affecting level dyeing on the Enka dyeing system³. The following aspects have been studied—

 Effect of temperature on degree of dispersion and particle size.

Effect of concentration and type of dispersing agent.

3. Classification of a number of commercial dyes according to particle size, including some which were chemically identical but varied in particle size as a result of the method of their manufacture.

 Comparison of filtration properties of dyes through two No. 1 Whatman filter papers and through a viscose rayon cake under practical dyeing conditions.

I. EFFECT OF TEMPERATURE

Suspension (1 g./litre) of the following dyes— Caledon Jade Green XN 300 Paste Fine Caledon Blue XRCS Paste Fine Caledon Pink RL 200 Paste Fine Caledon Gold Orange 3G 200 Paste Fine

were filtered under identical conditions to those given in Hampson's method, but one filtration was carried out at 80°C. and the others at room temperature. Filtration at the lower temperature was a little better than that at the higher temperature, more dye passing through the filter papers. The degree of pigment aggregation, however, did not suggest that temperature was a critical factor, and since padding is normally carried out at 80°C. or

above for other reasons, the higher temperature was made standard for subsequent tests.

2. EFFECT OF DISPERSING AGENTS

Comparative filtration tests were carried out at 80°c, on a number of vat dyes using the following dispersing agents—

(a) Dispersol VL (ICI)

(b) Lissapol LS (ICI) (sodium oleyl-p-anisidinesulphonate)

(c) Irgasol DA (Gy) (sodium dinaphthylmethane- $\beta\beta$ -disulphonate)

and also, as a standard for comparison, in certain cases in the absence of added dispersing agent. In Table I the numbers 1, 2, 3, and 4 indicate the order of decreasing effectiveness.

The effect of the dispersing agents, as judged by the filtration test, was more marked in the case of certain dyes than in others. From these results it appears that the choice of dispersing agent can materially affect the particle size—provided that it is accepted that Hampson's filtration technique is a criterion of particle size. Hence the best choice of dispersing agent could, in some cases, bring the vat pigment into a state of division similar to that which would be obtained by regrinding combined with the use of a less efficient dispersing agent.

TABLE I

TABLE I					
Dye		Dispersing Agent			
	None	(a)	(b)	(c)	
Caledon Jade Green XN 300 Paste Fine	3				
(ICI)	. 4	3	2	1	
Caledon Brown RS Paste Fine (ICI)		2	-	1	
Caledon Brown 3G 300 Powder Fine	9				
(ICI)	. 2	3	-	1	
Caledon Gold Orange 3G 200 Paste Fine	3				
(ICI)		2	4	1	
Caledon Red X5B 850 Powder (ICI)	. 2	3	-	1	
Alizanthrene Navy Blue RS Paste Fine	3				
(ICI)		2	3	1	
Tinon Chlorine Red B2R Double Paste					
(Gy)		2	-	1	
Tinon Chlorine Brilliant Violet 2B					
65% Paste (Gy)			-	1	
Caledon Olive RS Paste Fine (ICI)		1	-	2	
Caledon Red 5GS Paste Fine (ICI)		1	-	2	
Caledon Pink RL 300 Powder Fine (ICI) 4	1	2	3	
Caledon Green RC 300 Powder Fine (ICI) 2 .	1	3	4	
Caledon Gold Orange 3G 300 Powder	r				
Fine (ICI)	. 1	2	3	3	
Caledon Blue XRCS Paste Fine (ICI)		1	3	2	
Caledon Yellow 2RS Paste Fine (ICI) 2	3	1	4	
Caledon Brilliant Violet RS Paste Fine	В				
(ICI)	. 3	2	4	1	
Caledon Red 2G8 Paste Fine (ICI)		2		1	
Caledon Blue RC 300 Powder Fine (ICI) -	1	3	2	

3. CLASSIFICATION OF DYES BY THE FILTRATION TEST

Since no advantage was apparent from using Lissapol LS as the dispersant in these tests, and since in the actual dyeing process the use of Dispersol VL is desirable on account of its restraining and levelling properties, the latter was made the standard dispersing agent in our further experiments. We had examined the effect of concentration of Dispersol VL and Lissapol LS on the dispersing properties of these products over the

range 0-10 g./litre, and found that low concentrations were just as effective as high concentrations. Hence 0.25 g./litre was specified as standard and used in all subsequent filtration tests. Under these conditions a number of vat dves were examined, and classified as shown in Table II. The assessment was carried out by comparing dyeings made from the filtrate with dyeings made from 25%, 50%, and 75% of the strength of the original unfiltered dye suspension.

TABLE II

Classification of Dyes by Filtration Test

Class I-Small particle size (> 75% of dye suspension filterable)

Caledon Blue RC 300 Powder Fine (ICI) Caledon Red 2GS Paste Fine (ICI)

Caledon Red 5G8 Paste Fine (ICI)

Caledon Jade Green XN 300 Paste Fine (ICI)

Caledon Jade Green XN 300 Powder Fine (ICI) Tinon Chlorine Brilliant Violet 2R 65% Paste (Gy)

CLASS II- MEDIUM particle size (50-75% filterable)

Cibanone Blue GF Paste (Ciba)

Caledon Blue GXDS Paste Fine (ICI)

Caledon Blue XRCS Paste Fine (ICI)

Caledon Olive RS Paste Fine (ICI)

Caledon Gold Orange 3G 300 Powder Fine (ICI)

Caledon Pink RL 200 Paste Fine (ICI)

Caledon Pink RL 300 Powder Fine (ICI)

Caledon Green RC 300 Powder Fine (ICI) Caledon Brilliant Violet RS Paste Fine (ICI)

Class III -- Medium-Large particle size (25-50% filterable)

Tinon Chlorine Black DRB Fine Powder for Dyeing

(Gv) Tinon Printing Black BL 40% Paste (Gy)

Paradone Bordeaux RR Paste (LBH)

Caledon Red BNS Paste Fine (ICI)

Paradone Blue RC Paste (LBH)

Paradone Brilliant Pink R Paste (LBH)

Alizanthrene Navy Blue RS Paste Fine (ICI)

Caledon Brown 3G 300 Powder Fine (ICI)

Class IV -- Large particle size (< 25% filterable) Caledon Direct Black RS Paste Fine (ICI) Tinon Chlorine Brilliant Pink 2R Paste (Gy) Sandothrene Grey NBG Ultrafix Paste (S)

Caledon Brilliant Orange 4RNS Paste Fine (ICI)

Caledon Olive Green B 200 Paste Fine (ICI)

Paradone Brilliant Orange GR Double Paste (LBH) Caledon Blue RCS Paste (ICI)

Caledon Dark Brown 6RS Paste Fine (ICI)

Caledon Gold Orange 3G 200 Paste Fine (ICI)

Paradone Red Brown 2RD Paste (LBH)

Cibanone Brown GR Paste (Ciba) Caledon Brown GS Paste Fine (ICI)

Paradone Grey M Double Paste (LBH)

Caledon Yellow 2RS Paste Fine (ICI)

Caledon Dark Brown 2GS Paste Fine (ICI)

Caledon Brilliant Red 3BS Paste Fine (ICI)

Tinon Chlorine Red B2R Double Paste (Gy)

Paradone Brilliant Orange RK 200 Paste (LBH)

Caledon Brilliant Orange 6RS Paste Fine (ICI)

Caledon Brown RS Paste Fine (ICI)

Caledon Yellow 4G8 Paste Fine (ICI)

Indanthren Orange GG Paste (FBy) Caledon Red X5B 850 Powder (ICI)

Variations of particle size do occur within a class, and, in Table II, dves at the head of a class are those of smallest particle size within that class. It is apparent that approximately half of the dyes examined fall into Class IV.

4. FILTRATION PROPERTIES THROUGH A RAVON CAKE

The whole of the work so far was based on the filtration properties of the vat pigments through two thicknesses of No. 1 Whatman filter paper. In dyeing practice, of course, we are interested in the filtration properties of the dye through a viscose rayon cake, and therefore our next step was to correlate, if possible, the effects of these two filtration materials.

Cox 4 recommended that in cake dyeing the yarn should be padded with vat pigment dispersed in a solution of Dispersol VL (5-10 g./litre). filtration tests, however, suggested that concentrations of 0.25 g./litre were just as effective, and therefore the padding stage of the dyeing process was carried out at this concentration. The duration of the padding was 2 hr., and the caustic soda, which is a necessary adjunct of the subsequent reduction process, was added during the last 30 min. At this stage the caustic addition is merely acting as an electrolyte addition, causing aggregation of the small dye particles and promoting exhaustion. Samples of the padding liquor were withdrawn at 15-min. intervals, reduced, and dyed on to 5-g. hanks, which were then compared. The gradation of these dyeings indicated the progress of exhaustion, which is, of course, a direct measure of the filtration properties of the dye through the cake. Dyeings of samples based on a percentage concentration of the original bath before padding were again used as standards for the classification of the dyes.

It was found that, with the exception of dyes of very large particle size, exhaustion of the dyebath

TABLE III

Classification of Dyes by Filtration through

a Rayon Cake	Class in
	Table II
Class I (> 75% of pigment left in bath)	A GOLDEN AA
Caledon Blue RC 300 Powder Fine	1
Caledon Pink RL 200 Paste Fine	11
Caledon Red 2GS Paste Fine	1
Caledon Green RC 300 Powder Fine	11
CLASS II (50-75% left in bath)	
Caledon Blue XRCS Paste Fine	11
Caledon Red 5GS Paste Fine	- I
Caledon Jade Green XN 300 Powder	I
Caledon Jade Green XN 300 Paste Fine	I
Caledon Brown 3G 300 Powder Fine	111
Tinon Chlorine Brilliant Violet 2R Paste	I
Class III (25-50% left in bath)	
Caledon Pink RL 300 Powder Fine	11
Caledon Gold Orange 3G 200 Paste Fine	IV
Caledon Gold Orange 3G 200 Powder Fine	II
Class IV (< 25% left in bath)	
Alizanthrene Navy Blue RS Paste Fine	111
Paradone Brilliant Orange GR Double Paste	IV
Caledon Brown RS Paste Fine	IV
Tinon Chlorine Red B2R Double Paste	IV
Sandothrene Brilliant Orange NGK	
Ultrafix Paste (S)	-
Caledon Red X5B 850 Powder	IV



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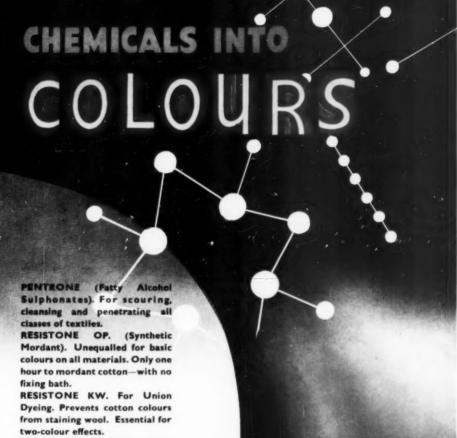
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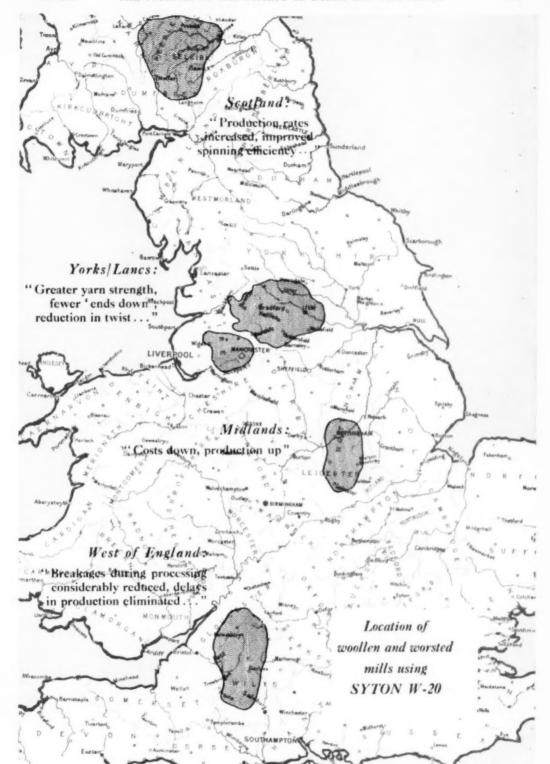
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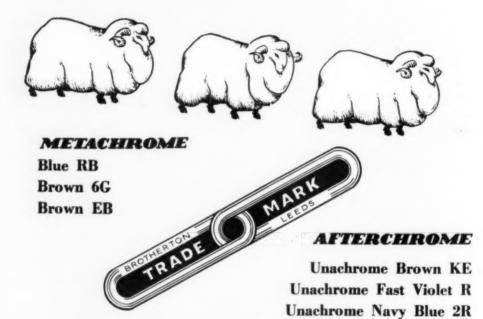


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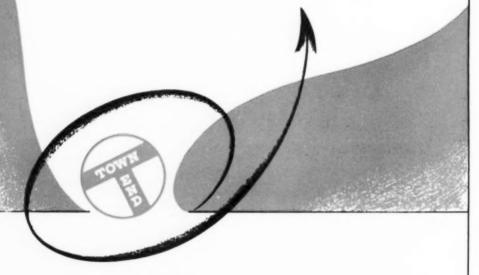


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was progressive, and was accelerated by the addition of electrolyte, although the sensitivity to electrolyte varied from one dye to another. The vat pastes were again graded into four classes according to the amount of unabsorbed pigment present in the dyebath after padding for 15 min.

It was found that this classification, although based on similar lines to that of Table II, placed some dyes in a different category (Table III) from that obtained previously.

There is a fair degree of correlation between the classifications, no dye having moved up or down by more than one class. The slight variation in the classifications can be understood when the wide difference in the two types of filter materials is taken into account. A dye could contain particles of such a size that they would block the pores of the filter paper, and would be classified in Table II as being of large particle size. The interstices between the varn in a cake, however, could allow particles of this size to filter through, and hence the dye would be given a lower particle size in Table III. On the other hand, another dye, of the same average particle size, could contain some particles which were too large to block the pores of the filter paper, and consequently smaller particles contained in the same sample of the paste would pass freely through into the filtrate. Its classification in the test, therefore, would be numerically lower than that of the previous dye. On passing such a dye through a cake, the large particles could filter out, and form a less permeable filter bed for the small particles, so that its numerical classification in Table III would be higher (greater particle size).

EFFECT OF PARTICLE SIZE ON DYEING RESULTS

The effect of particle size on actual dyeing results was studied by means of the following standard dyeing method—

The cake was padded at 85°c, for 2 hr, in a 30:1 liquor containing 2.5 g. dye (yielding a 7% dyeing) and 0.25 g. Dispersol VL per litre. Over the last 30 min. of padding the dyebath temperature was allowed to fall to 65°c., and at the same time caustic soda solution was drip-fed into the bath, bringing the sodium hydroxide content per litre of the dyebath up to 3.5 g. for weak-alkali dyes and 5 g. for strong-alkali dyes. Dispersol VL and sodium pyrophosphate (2.75 g. and 1 g. per litre respectively) were then added 5, followed by sodium hydrosulphite (4 g./litre) to effect reduction to the leuco form. Dyeing was continued for a further 90 min., the bath was then run to waste, and the yarn rinsed to reoxidise the dye and then soaped at the boil. The cake was dried and knitted into a stocking of four sections: outside-middle-insideoutside. The levelness of the dveing was assessed visually on the appearance of the knitting.

From the dyeings it was apparent that particle size alone gave no indication as to whether or not the dye was suitable for cake dyeing (Table IV). The dye with the largest particle size gave a perfectly level dyeing, whereas a dye of small particle size, e.g. Tinon Chlorine Brilliant Violet 2R, gave a

very uneven dyeing. From these results it was evident that other factors must play a more important part than particle size in governing levelness of shade.

Table IV Classification of Dyes by Level-dyeing Properties

	Class in Table II
Class 1— Level Dyeings	
Caledon Red 5G8 Paste Fine	1
Caledon Jade Green XN 300 Paste Fine	I
Caledon Olive RS Paste Fine	11
Caledon Pink RL 200 Paste Fine	11
Caledon Brilliant Violet RS Paste Fine	11
Caledon Red BNS Paste Fine	III
Caledon Gold Orange 3G 200 Paste Fine	IV
Caledon Yellow 2RS Paste Fine	IV
Caledon Navy Blue 2R8 Paste Fine	IV
Caledon Red X5B 850 Powder	IV
Caledon Brilliant Orange 4RNS Paste Fine	IV
Caledon Brilliant Orange 6RS Paste Fine	IV
Tinon Chlorine Brilliant Pink 2R Paste	IV
Paradone Brilliant Orange RK Paste	IV
Caledon Yellow GN 200 Paste Fine	1V
Class 2— Fairly Good Dyeings (but slight inside-to-outside differences)	
Caledon Red 2GS Paste Fine	1
Caledon Blue RC 300 Powder Fine	1
Caledon Blue XRCS Paste Fine	11
Tinon Chlorine Printing Black BL 40%	
Paste	111
Sandothrene Grey NBG Ultrafix Paste	IV
Caledon Dark Brown 2GS Paste Fine	IV
Caledon Yellow 4G8 Paste Fine	IV
Class 3— Large Inside-to-outside Differences	
Cibanone Blue GF Paste	H
Caledon Green RC 300 Powder Fine	11
Tinon Chlorine Red B2R Double Paste	IV
Caledon Dark Brown 6RS Paste Fine	IV
Caledon Brown GS Paste Fine	IV
CLASS 4—VERY IRREGULAR DYEINGS	
Tinon Chlorine Brilliant Violet 2R Paste	1
Caledon Blue GXD8 Paste Fine	11
Caledon Brown 3G 300 Powder Fine	III
Paradone Blue RC Paste	III
Alizanthrene Navy Blue RS Paste Fine	111
Caledon Blue RCS Paste	IV
Caledon Brilliant Red 3BS Paste Fine	IV
Paradone Brilliant Orange GR Double Paste	IV
Caledon Brown RS Paste Fine	IV
Caledon Direct Black RS Paste Fine	IV
Paradone Red Brown 2RD Paste	IV
Paradone Grey M Double Paste	IV
Paradone Bordeaux RR Paste	III
Indanthren Green 4G Paste (FBy)	IV
Indanthren Orange GG Paste	IV

COMPARISON OF IDENTICAL DYES OF DIFFERENT PARTICLE SIZE

Dyeings were carried out with samples of a dye (C.I. 1114) which were obtained from different sources and varied in particle size (Table V).

Dyeings of the paste fine and powder fine brands f—

Caledon Gold Orange 3G 200 Caledon Jade Green XN 300 Caledon Pink RL 200

TABLE V

Sample	Class by Filtration Test	Dyeing
1	II	Level
2	1	Inside dyed fuller than outside
3	11	Inside dyed much fuller than outside
4	IV	Inside dyed fuller than outside, irregular
5	Ш	Inside dyed fuller than outside, irregular

were then carried out, and it was found that the paste fine brands gave a slightly better dyeing in each case. The particle sizes of the Caledon Pink RL and Caledon Jade Green XN were very similar for the paste fine and powder fine forms. The particle size of the Caledon Gold Orange 3G paste fine, however, was much larger than that of the powder fine brand, and yet it gave the more level dyeing.

In examining the effects of different dispersing agents on the filtration properties of vat pigments it was found that in certain cases the effect of Irgasol DA was sufficiently marked to move the dye from one class to another (Table VI). Dyeings were carried out using both dispersing agents with these dyes, but no significant improvement resulted from the use of Irgasol DA.

TABLE VI

F	iltration Class using-		
Dye	Dispersol VL	Irgasol DA	
Alizanthrene Navy Blue RS Paste	Ш	П	
Caledon Gold Orange 3G 200 Paste	IV	Ш	
Caledon Brown 3G 300 Powder Fine	IV	III	
Caledon Brown RS Paste Fine Caledon Red X5B 850 Powder	IV	111	
Tinon Chlorine Red B2R Double Paste	IV	Ш	

This limited number of tests yielded little to indicate any appreciable effect of particle size on the levelness of the dyeing. The cake-dyeing experiments had been carried out on cakes of 200/42 lustre yarn which had been desulphurised and washed out but had not been dried between the spinning and dyeing processes. The machine used was of the open type with unidirectional flow—from the inside to the outside of the cake. The series of experiments summarised in Table V was repeated in an enclosed machine having two-way circulation, with both dried and undried cakes. There was no significant difference between the dyeings on the two kinds of yarn.

It may be concluded from these experiments that pigment particle size is not the primary factor in the successful vat dyeing of cakes. Dyes of small particle size do give more level pigmentation of the yarn, but this is not sufficient to yield a completely level result on subsequent reduction and dyeing. Even with those dyes which gave the best final results, the distribution through the cake was quite uneven after the pigmentation stage. If it were not for the levelling effect during the reduction stage of the process, vat dyeing of cakes could not be considered a practical proposition.

It was noticed in these experiments that there was generally a considerable return of dye from the padded cake to the dyebath immediately on reduction, and this must considerably reduce the efficiency of the padding treatment. Let us assume that a cake is perfectly evenly padded, and that reduction takes place in situ without any return of dye to the bath; then the efficiency of the pigmentpadding process of dyeing will be 100%. If dye is returned to the bath on reduction, and still assuming that the pigment remaining in the cake is evenly distributed, the efficiency of the padding process must be reduced by the percentage return of dye to the bath. The percentage of dye which does not return to the dyebath is referred to in Table VII as the padding efficiency of the dye. With dyes of low rate of strike or low final exhaustion the padding efficiency is low. The retarding action of Dispersol VL reduces the strike and exhaustion of most vat dyes, the degree of retardation being governed by the individual sensitivity

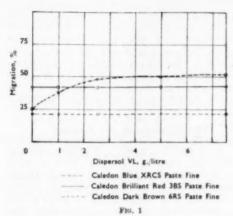
TABLE VII

Padding Efficiency and Final Exhaustion

(10% Dispersol VL on wt. o	f yarn at	65°C.)
Dye		Final† Exhaustion of Dyebath (%)*
Caledon Red X5B 850 Powder	28	55
Caledon Red 5GS Paste Fine	28	45
Caledon Navy Blue 2RS Paste Fine	31	43
Indanthren Green 4G Paste	32	78
Caledon Yellow 2RS Paste Fine	38	73
Caledon Jade Green XN 300 Paste		
Fine	43	78
Caledon Yellow 4GS Paste Fine	50	86
Alizanthrene Navy Blue RS Paste		
Fine	50	55
Caledon Brilliant Red 3B8 Paste		0.7
Fine	50	95
Caledon Brown GS Paste Fine	52	75
Caledon Brilliant Orange 4RNS	***	20
Paste Fine	53	70
Indanthren Orange GG Paste	54	86
Paradone Red Brown 2RD Paste Caledon Brilliant Violet RS Paste	55	78
Fine	55	62
Caledon Olive RS Paste Fine	56	68
Caledon Dark Brown 2GS Paste	.00	08
Fine	56	71
Caledon Green RC 300 Powder Fine	61	62
Caledon Dark Brown 6RS Paste		
Fine	62	79
Caledon Pink RL 200 Paste Fine	64	73
Caledon Gold Orange 3G 200 Paste		
Fine	64	96
Caledon Brown 3G 300 Powder		
Fine	66	96
Caledon Yellow GN 200 Paste Fine	67	94
Caledon Olive Green B 200 Paste		-
Fine	69	83
Caledon Brilliant Orange 6RS Paste		0.4
Fine	70	84
Caledon Red 2GS Paste Fine	72	93
Caledon Blue GXDS Paste Fine	75	90
Paradone Bordeaux RR Paste	79	94
Caledon Blue XRCS Paste Fine	82	85

Concentration of dyebath determined both colorimetrically and by sample dyeings (p. 20).

[†] After 90 min. dyeing following reduction (p. 21).

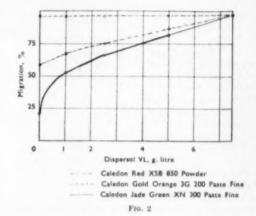


of the dye to Dispersol VL. Speke 6 has defined the sensitivity factor as the lowering of exhaustion occasioned by the introduction of 1% Dispersol VL.

As the rate of strike decreases, the importance of level padding, and therefore of particle size, also decreases. In the case of Caledon Red X5B 850 Powder, where there is a very large return of dye to the bath on reduction, level pigmentation is unimportant. In the case of dyes like Caledon Blue XRCS, where the affinity of the reduced dye is so great that dyeing really does take place in situ, and very little dye is returned to the dyebath, level pigmentation assumes a more important rôle. Even here, however, some levelling action during the reduction stage is essential. The presence of a levelling agent is necessary to promote diffusion of the dye (in its leuco form) into the fibre, and hence it is impossible to prevent some dye from being returned from the cake to the dyebath at the reduction stage. In general, it was found that where the return of pigment to the bath is large and the readsorption of the reduced dye is relatively slow, level dyeings were obtained. For this reason it appears that the importance of level padding in cake dyeing has been overemphasised and that at the most it can play only a minor part.

The levelness of dyeing can be promoted by retarding the rate of dyeing, and by increasing the rate of migration or colour redistribution. No general correlation was found between the sensitivity factor to Dispersol VL 6 and the levelness of dyeing of the dyes listed in Table IV

The rates of migration of three level-dyeing and of three non-level-dyeing dyes in the presence of various amounts of Dispersol VL were determined. The tests were carried out in a 30: 1 liquor for 1 hr.



at 65°c. in a similar manner to that recommended in the Report of the Committee on the Dueing Properties of Vat Dyes 7.

It will be seen from Fig. 1 and 2 that with the non-level-dyeing dyes migration is very poor, even in the presence of large amounts of Dispersol VL. whereas in the case of the level-dyeing dyes the migration is high. A comparison of the sensitivity factor with migration does not show any correlation between the restraining effect of Dispersol VL and its ability to promote colour redistribution.

From these experiments it is concluded that the degree of levelness of the ultimate dyeing which can be obtained from even distribution of the vat pigment is limited, and that the dyer would have greater scope by relying for his control on the promotion of migration and on the use of effective retarding agents.

The author wishes to express his thanks to the Directors of British Enka Ltd. for permission to publish this paper, and to Mr. E. Stone for his co-operation and assistance in the preparation of this work.

DYE LABORATORY BRITISH ENKA LTD. AINTREE LIVERPOOL 9 (Received 19th July 1952)

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¹ ICI, BP 593,008.

² Hampson, J.S.D.C., 67, 369 (1951).

Flanagan, Dyer, 107, 663 (2 May 1952).
 Cox, J.s.D.C., 62, 41 (1946).

⁵ Brearley and Starkie, 64, 280 (1948).

Speke, J.S.D.C., 66, 569 (1950).

7 J.S.D.C., 66, 505 (1950).

Notes

Proceedings of the Council

At a meeting of the Council held at the offices of the Society, 19 Piccadilly, Bradford, on 12th November 1952, the proceedings included the following items of interest—

Textile Institute U.T.M.C.—Mr. K. McLaren (Honorary Secretary of the Fastness Tests Coordinating Committee) was nominated to represent the Society on the Unification of Testing Methods Committee of the Textile Institute, on which the Society is already represented by Mr. R. H. Ricketts.

Feltmakers Company Medal.—It was reported that, as no papers on feltmaking had been published in the *Journal* during the period July 1951 to June 1952, again no award of the medal could be made.

LEEDS JUNIOR BRANCH—The election, at the Annual General Meeting of the Branch on 17th October 1952, of the following officers and committee members for the 1952–53 session was reported—

Chairman ... C. B. Stevens Vice-chairman ... C. L. Bird

Committee ... I. G. Laing, A. Lister, R. McGregor, and (Miss) J. M. Wilson

Honorary Secretary E. R. Inman

Third Canadian Textile Seminar—It was reported that Dr. C. S. Whewell had expressed formal greetings from the President and Council, and that the gathering had greatly appreciated this expression of goodwill from Britain.

Membership—Thirteen applications for ordinary membership and eight for junior membership were approved.

Meetings of Council and Committees December 1952

Council—10th
Finance—3rd
Publications—16th
Colour Index Editorial Panel—12th
Examinations Subcommittee—3rd
Printing Symposium—19th

Fifty Years' Membership

The following members—Messrs. A. Baker, J. Heggie, F. W. Walker, and W. P. Walker—joined the Society in 1903, and have thus completed fifty years of membership. The Council wishes to congratulate them on this notable achievement, and trusts that they may long be spared to continue their interest in the Society's activities.

Dyers and Finishers Association Prize

The Dyers and Finishers Association has offered ten guineas annually as prize money for junior members in the West Riding of Yorkshire, and Council has expressed its deep gratitude for the offer. This year three prizes, of six, three, and one guinea respectively, will be awarded for a written paper on a subject related to textile dyeing, to be submitted by 13th February 1953. Full details and entry forms can be obtained from the Honorary Secretary of the Bradford Junior Branch, Miss M. Forbes, 2 Farfield Road, Buttershaw, Bradford, Yorks.

The Printers of the Journal

Volume 19 of the Journal (1903) was the first to bear the imprint: Chorley and Pickersgill, The Electric Press, Leeds and London. Thus, as mentioned by the President at the Annual Dinner (J.S.D.C., 68, 154 (May 1952)), with the present issue this firm has completed fifty years of the "very exacting task" of printing the Journal. The setting of scientific and technical matter, with complex chemical and mathematical formulæ, tables, and diagrams, is highly specialised work, and our printers have always been prepared to pay great attention to clarity of layout and typography. A half century of cordial business relations is probably not of frequent occurrence, and the Society trusts that the close co-operation with "C & P" may continue for many years to come.

Abbreviations

The Publications Committee has approved the following additional or modified abbreviations, which may be employed, where appropriate, in the Journal in future—

Other general abbreviations and symbols will be found at the end of the annual index, together with abbreviations of names of firms, etc. (listed also on p. 23 of the January 1952 Journal) and of titles of periodicals abstracted.

Tentative Definitions

The Terms and Definitions Committee will welcome comments on the following tentative definitions—

23. SALT SENSITIVITY

(a) (in dyeing) The extent to which the dyeing properties of a dye are affected by the addition of a neutral electrolyte.

(b) (of dyed fabric) The susceptibility of a dyed material to colour change when spotted with aqueous solutions of neutral electrolytes.

24. SPUN-DYED

Adjective applied to manufactured fibres in which the colouring matter has been incorporated before the filament is formed.

Note — This term does not imply any specific fastness properties.

I.S.O. Fastness Meetings in New York

A further stage was reached in November in the efforts which are now being made to establish international fastness tests. Following previous meetings at Buxton in 1948 and Bournemouth in

1951, a further series of meetings of the Colour Fastness Subcommittee ISO/TC 38/SC 1 of the International Standards Organisation were held in New York on 10–12th November 1952, under the auspices of the American Standards Association. Since the previous meeting in 1951 there has been a continuous interchange of views between the Society's Fastness Tests Co-ordinating Committee on the one hand and the European Continental Group and the A.A.T.C.C. on the other.

The meeting was opened by Admiral Hussey, Jr., Managing Director of the A.S.A., who welcomed delegates from the U.S.A., Canada, France, Great Britain, Switzerland, Germany, and India. The British delegates comprised Mr. K. McLaren, Mr. E. Wilson, and Dr. P. W. Cunliffe, who acted as leader.

Mr. W. D. Appel, of the U.S. National Bureau of Standards, took the chair at this and subsequent meetings.

The following tests were discussed in detail-

Acid spotting Potting Alkali spotting Rubbing Carbonising Sea water Chrome in dyebath Soda boiling Hypochlorite bleaching Stoving Light Washing Mercerising Water Peroxide bleaching Water spotting

In addition to the tests themselves, the Sub-committee discussed the means by which the results are to be assessed, and reached a tentative agreement on the use of the two grey scales, one for assessing the effect on the pattern and one for assessing the degree of staining on adjacent white material. It is hoped to publish the provisional international tests and their method of assessment in an early issue of the *Journal*.

PWC

A.A.T.C.C. Annual Convention 1952

The Annual Convention of the A.A.T.C.C. was held in Boston on 5–8th November 1952, and was attended by the three delegates from the F.T.C.C. prior to the L.S.O. meetings in New York.

By invitation of the President of the A.A.T.C.C., Dr. P. W. Cunliffe attended a meeting of its Council, and at the close extended greetings from the President and Council both of the Society and of the Textile Institute. Mr. C. Norris Rabold, the President, thanked the two bodies for their message, and expressed the cordial good wishes of his Association.

At the annual banquet, which was held at the Statler Hotel on November 8th, Dr. Cunliffe thanked the A.A.T.C.C. for the kindness and hospitality which had been shown to the British and other overseas delegates. He presented to the President, for deposit in the Association's library, a specially bound volume of the Society's Conference on "The Tinctorial Arts To-day".

PWC

President of the A.A.T.C.C.

Mr. J. Robert Bonnar has been elected President of the A.A.T.C.C. in succession to Mr. C. Norris Rabold. Mr. Bonnar was formerly chairman of the Executive Committee on Research of the A.A.T.C.C.

C.G.I.A. New Technology Award

The City and Guilds of London Institute has established an Insignia Award in Technology (C.G.I.A.), which will lay emphasis upon technical training based primarily upon practical experience, supplemented by theoretical study, as distinct from the more academic approach to training, for which many educational facilities and inducements already exist. This new award is intended to be a mark of distinction for those who have combined with a sound practical training an adequate knowledge of the fundamental scientific principles of their industry, and who possess a capacity for leadership and administration. The institution of this award has two further objects. In the first place, it will encourage those who have completed a course of training in some branch of industry to extend their studies to its broader problems, and to widen their knowledge of the scientific principles upon which their industry is based. In this way they will become better able to apply new methods to their work and to know when to seek the assistance of those with more advanced and specialised knowledge. The Institute also believes that the introduction of the award will encourage students to take full advantage of the facilities provided in industry and technical colleges, and will lead to the recognition of the value of practical training and experience as basic requirements. The standard of the Insignia Award will be well above that of any existing Full Technological Certificate. The Institute intends to introduce the award gradually, as opportunity offers, in the main branches of the chemical, constructional, electrical, mechanical, and textile industries. should be addressed to the Director, Department of Technology (I.A.), City & Guilds of London Institute, 31 Brechin Place, London S.W.7.

International Congress for Pure and Applied Chemistry

With the thirteenth Congress, to be held in Stockholm from 29th July to 4th August 1953, will be associated a symposium on the chemistry of wood and wood constituents, which will include a section on the chemistry of cellulose and hemicellulose and the structure of natural and regenerated cellulose fibres. The Congress will be limited to physical chemistry, and will be followed by a symposium on macromolecules (Upsala, 5-7th August). Further details are available from the XIII International Congress for Pure and Applied Chemistry, Stockholm 70, Sweden.

O.C.C.A. Conference 1953

The biennial conference of the Oil and Colour Chemists Association will be held at Eastbourne on 3rd-5th June 1953, the subject being The Optical Properties of Films of Surface Coating Materials. Among papers of probable interest to members of the Society will be The Description of Surface Colours in Scientific Terms by Dr. W. D. Wright, Some Physiological Factors in the Appreciation of

Surface Colours by Dr. E. N. Willmer, Some Aspects of Colour Matching by Dr. T. Vickerstaff, and Colour Problems in Lithographic Printing by Mr. J. H. Brittain and Mr. A. D. Lott. Further details may be obtained from O.C.C.A., Memorial Hall, Farringdon Street, London E.C.4.

International Conference of Leather Chemists

The third Biennial Conference of Leather Chemists Societies, held under the auspices of the International Union of Leather Chemists Societies, will take place in Barcelona, Spain, on 13–18th September 1953, at the invitation of the Spanish Association of Leather Trades Chemists.

Centenary of the Royal Photographic Society

The centenary will be celebrated by the holding in London of an international conference on the science and applications of photography during 19-25th September 1953. The conference will be divided into five sections—photographic science (including the theory of the latent image, development, and sensitisation), cinematography and colour photography, technique and applications of photography (including photomicrography, spectrescopy, and photocopying), photomechanical processes, and history, literature (including abstracting and documentation), and training. Titles of papers, with indications of their scope, should be submitted before 1st February, and the full papers before 1st May 1953. Further details may be obtained from the Honorary Secretary, R.P.S. Centenary Conference, 16 Princes Gate, London S.W. 7.

Second International Congress of Rheology

This is to be held at St. Hilda's College, Oxford, during 26th–31st July 1953, and will cover the whole field of the deformation and flow of matter other than branches of applied mechanics. Further information can be obtained from the organising secretary, Dr. G. W. Scott Blair, University of Reading.

OBITUARY NOTICE

Fred Hern

The many members of the Society who have, on various occasions, taken part in visits to the Abbey Meadow Mills dyeworks of the Wolsey organisation will hear with regret of the death of the General Manager, Fred Hern, who passed away, after a painful illness, on 30th October 1952 at the early age of 53.

Joining the company during the 1914–1918 war, Mr. Hern, after completing army service, was appointed to the Central Materials Planning Section. After a considerable period as head of this department, he became General Manager of Abbey Meadow Mills in 1945. An organiser rather than a dye technician, he was widely known and respected in the Midlands dyeing industry; he served as Chairman of the Hosiery Dyers Federation, and was a prominent figure on the Joint Industrial Council to the trade. He was a good friend to our Society, inasmuch as he was always ready to offer the facilities of his company in our interests and to encourage active membership on the part of his staff. A strong believer in the force of personal example, he was highly respected by his workers; he also held important offices in the Methodist Church and in Freemasonry. He leaves a widow and one son.

A. W. CARPENTER

New Books and Publications

Polarography

Volume I

Theoretical Principles, Instrumentation, and Technique

Pp. xvii + 420. Price, \$9.00 or 72s. 0d.

Volume II

Inorganic Polarography, Organic Polarography, Biological Applications, Amperometric Titrations

Pp. xvii + 421-990. Price, \$11.00 or 88s. 0d.

By I. M. Kolthoff and J. J. Lingane. 2nd edition 1952. New York and London: Interscience Publishers.

Volume I

Polarographic analysis is now a very well established and extensively used physical method. The relative simplicity of the method, its considerable range of application, and its speed have made it one of the most popular of the instrumental methods of carrying out chemical analysis. Many applications have been found for this method in the

textile industry, particularly in connection with the evaluation of reagents and auxiliaries. For instance, in our own Journal (May 1950) a paper has recorded the use of the polarograph in the analysis of the commercial hydrosulphites and aldehyde-sulphoxylates. Many of the research associations and manufacturing companies within the industry possess polarographic equipment, but so far it would seem that its use has not been extensive. The appearance of an up-to-date and very comprehensive treatise in the English language on the subject may usefully serve to bring the advantages of the method to the notice of textile chemists—it is to be hoped they may be persuaded to make greater use of it.

Until the publication in 1941 of the first edition of the work being reviewed, there was no English text on polarography, but there were several admirable monographs in German. The very considerable literature on the subject, since its inception in 1925 by the Czechoslovakian physical

chemist, J. Heyrovsky, was scattered, mostly in Continental journals, some of which are available only at the larger and special libraries. Kolthoff and Lingane's book, therefore, met a very definite need: the first edition was certainly a success and had a marked influence on the progress of polarography in the U.S.A. and in Great Britain. There is little doubt that the authors' wish, expressed in the preface of the first edition, that their book might stimulate the further development of polarographic analysis and its applications in various branches of chemical science, has been amply fulfilled. Since its appearance, polarography has progressed extremely rapidly; a literature of 400 original papers in 1941 has now become well over 3000, and at present some 200 new papers are appearing annually. With these advances, it is quite clear that a new edition of the work was essential and long overdue. The new edition is a complete revision and reorganisation. The full work is about twice the length of the original edition and this has necessitated publication in two volumes. Generally, the style and scope of the first edition have been maintained, but there are new chapters. For example, Chapter V on the use or non-aqueous solvents in polarographic work is new.

Volume I deals with the theoretical principles and with instrumentation and technique, whilst Volume II will consider practical analytical procedures and applications of the method. It must be conceded that a proper and thorough appreciation of the theory of the method is of the utmost importance, and Kolthoff and Lingane attack the problem with success, their treatment being given with the greatest clarity. The section on instru-mentation and technique is adequate and well written. The new chapter which summarises important experimental factors to be considered in a polarographic procedure should prove of much value to a newcomer to the polarograph. Reference in this chapter to the advisability of taking reasonable safety precautions when working with mercury is timely in view of the large quantity of mercury which is employed. There is no reference to one of the well known and much used British pen-recording polarographs; presumably some selection had to be made, and instruments of American design naturally claim preference in an American text. In any case, descriptions of the selected instruments are forced by reasons of space to be rather fragmentary.

With a relatively new subject, which, as pointed out above, is growing so rapidly, it is undoubtedly a very difficult task to discuss and appraise all the views on some theoretical topics which are still highly controversial. Kolthoff and Lingane have succeeded notably in maintaining a balanced view, but there may be some who disagree with their conclusions. For instance, the interpretation of the so-called "water current" described by Orlemann and Kolthoff (J. Amer. Chem. Soc., 64, 833 (1942)) has been criticised by Hans and Stackelberg (Z. Elektrochem., 54, 65 (1950)), but this is not mentioned in the authors' discussion of this topic.

Volume II

The preceding review of Volume I of the revised and extended second edition draws attention to the considerable scope and wide range of application of the method of polarographic analysis. The new Volume II, which deals entirely with applications of the principles and techniques, so well discussed in the first volume, emphasises this statement in a remarkable way. The first section, on inorganic polarography, discusses in a systematic way determinations of cations and anions, certain elements, such as oxygen and sulphur, and inorganic compounds, such as hydrogen peroxide and nitric oxide, in many cases when these are constituents of various mixtures, e.g. alkali metals in ceramics, titanium in clay, zinc in plants, soils and paints, cadmium in atmospheric dusts, oxygen in natural waters. The reduction of sulphurous acid, the oxidation of the hydrosulphite, thiosulphate, and the sulphide anions at the dropping mercury electrode, and the application of the results to the analysis of the constituents of commercial sodium hydrosulphite preparations are discussed at length in a satisfactory manner. The final chapter of this section (XXXV) presents many selected typical procedures, the reliability of which has been proved, for the analysis of various types of alloys and certain technical products, sufficient detail being given to enable a worker to carry out the determinations without needing reference to the original sources. This extensive chapter should be of outstanding interest to the metallurgical analyst. A dye chemist will not find much of direct interest in this section, though if he should be called upon to detect and determine traces of such metals as copper and iron in waters, dyes, and dyebaths, the polarographic procedure can offer many advantages. The interesting BIOS 1458, Polarography in Germany, referred to work on the determination of metallic impurities in dyes, but this report is overlooked (or, perhaps, was weeded out) in the new volumes.

The second section (Part Four of the whole work) discusses organic polarography at length. The authors have had the advantage of the co-operation of Professor S. Wawzonek (an organic chemist who has maintained a strong interest in polarography) in writing this section. It is pointed out in the preface to Volume II that organic polarography is in a chaotic state—the endeavour to give it a systematic treatment is admirably successful, but the trouble lies not with the authors of Polarography but with the work of many previous researchers. A re-examination of the polarography of many organic substances on more up-to-date lines is urgently required. Details of the polarography of many groups of substances are given-unsaturated hydrocarbons, organic halogen compounds, carbonyl compounds, quinones, organic acids and their derivatives, nitro compounds and their reduction products (nitroso, azo, and amino compounds and diazonium salts), sulphur compounds, and heterocyclic compounds. The chemist in industries producing and utilising dyes and their intermediates will find that little systematic work on the polarography of such compounds has been

done, but there is abundant evidence that such work would ultimately pay handsomely. The polarographic determination of the sequestering agent, ethylenediaminetetra-acetic acid, now used extensively in the textile industry, is described in detail, but there is little mention of detergents and other textile assistants. Volume I, however, contains a section (p. 184) dealing with the analytical use of the suppression of maxima and adsorption analysis. Here, papers by von Stackelberg and his co-workers on the estimation of surface-active constituents in natural and effluent waters and on the determination of Mersolate in commercial cleansing products are fully discussed.

The next section, biological applications, deals mainly with the catalytic waves of cystine, etc. and applications to the serological detection of cancer, whilst finally there is an excellent section on the useful amperometric titrations.

The task of covering the literature on the applications of polarography is stupendous. The authors have been highly successful, little of importance having been omitted. The style is readable and clear, errors are few, but several misprints in references, e.g. in authors' names, have been detected. Production is in every way excellent, and authors and publishers must be congratulated for a most praiseworthy addition to the literature.

W. CULE DAVIES

An Advanced Treatise on Physical Chemistry Volume Three

The Properties of Solids

By J. R. Partington. Pp. lx + 639. London:
Longmans, Green & Co. 1952. Price, 70s. 0d.
In this third volume, Professor Partington continues the provision of a comprehensive and systematic treatise on physical chemistry. As in the two previous volumes, the emphasis is on data and results, but a considerable amount of theory is included. The author also repeats the list of literature abbreviations and definitions of symbols used, so that the book is self contained. This volume covers mechanical and thermal properties of solids (optical and electrical properties remain to be dealt with in the next volume), and undoubtedly represents the most complete and general account of such properties.

The book deals first with crystals, including an account of X-ray crystallography which is more complete than usually given in books on physical chemistry. Isomorphism is then dealt with in detail. Sections on elastic properties, tensile strength, and hardness are particularly useful, as these subjects are becoming of increasing interest to physical chemists. Accounts of the surface energy and viscosity of solids are also included. Thermal properties considered include expansion and some account of methods of determination of specific heats and calorimetry, which includes details of calorimeters and cooling corrections. Further sections include the theory of the solid state, thermal conductivity, and fusion. The book concludes with 75 pages of mathematics dealing with vectors and tensors, the complex variable,

and the notation of the calculus of variations. This mathematical appendix is ably presented, and the account of the methods used may overcome the inferiority complex suffered by many chemists on seeing such methods employed.

The book is undoubtedly the product of an immense amount of work. The approach is, in general, historical, and the many thousands of references include a large number to older work. While Professor Partington is at pains to justify this in his preface, some readers may wish that data had been more critically selected. There are few references to textile materials such as wool and cellulose or to dyes, and it is perhaps a pity that more references to the elastic properties and structure of fibres could not have been included. Other references are very full, and there are bibliographies of each topic. The book is of great value for the facts and data provided. While those concerned with theory may find it less valuable in giving the most modern approach, it is an essential volume in the library of the physical chemist.

W. R. MOORE

A Short Guide to Chemical Literature

By G. M. Dyson. Pp. vii + 144. London: Longmans, Green & Co. 1951. Price, 8s. 6d.

The purpose of this book is to supply "a modern introduction to the literature of chemistry for students and research workers, . . . a beginner's guide to the vast subject of chemical documentation", as there have been many changes since the publication, some twenty-five years ago, of the books by F. A. Mason and by E. I. Crane and A. M. Patterson respectively.

The Introduction (6 pp.) contains a useful annotated list of chemical dictionaries and encyclo-

pædias.

Chapter II (25 pp.) discusses national and specialised chemical journals, journals of technology, and ephemeral publications. Here it would have been encouraging to the student to have been informed that papers in many of the journals published in the smaller European countries- and in the U.S.S.R. until 1947- are written in English, French, or German. On p. 20 it is stated that the Sitzungsberichte der Akademie der Wissenschaften in Wien was discontinued in 1942 (vol. 151), but abstracts from vol. 161 (1952) will be found in a recent issue of this Journal. On p. 29 the Textile World is ascribed to this country instead of the U.S.A., it is implied that our own Journal is concerned with dyes but not with their application, and Teintex is referred to only by its pre-war name.

Chapter III (5 pp.), on abstract journals, is necessarily little more than a list with comments on the three chief series of abstracts. A notable omission is the abstracts section of the *Journal of*

the Textile Institute.

Textbooks and special works of reference are discussed in a much longer chapter (25 pp.), in which it is suggested that useful monographs may be written from abstracts! Notes are given on the most important works of reference, grouped under the headings—historical, analytical, inorganic and

physical, mineral and metallurgical, biochemistry, and organic chemistry—the last including a useful account of Beilstein.

A very valuable chapter discusses the technique of making a literature search. The necessity of using commonsense is stressed, e.g. in deciding whether solubility can be determined more rapidly in the library or in the laboratory, and useful general hints are given. Details are presented of a search for information on a particular compound, the entries found in Beilstein and in the index to Chemical Abstracts are reproduced and discussed, and the necessity of a certain agility in nomenclature is emphasised. It is pointed out that there are cases, e.g. compounds used mainly as solvents or as starting points in syntheses, in which complete literature searches are practically impossible.

Tables showing the year and volume number of the main chemical publications should be invaluable to authors and editors in checking references (it has been known for a reference to be correct in all details except that the wrong journal is cited!). A list of obsolete journals should prove valuable to those who have to search nineteenth-century literature.

Finally, it may be said that the book fulfils its purpose of a handy pocket guide to chemical literature, and can be warmly recommended. In a second edition or printing, the opportunity should be taken to correct the few misprints and a certain inconsequence in the spelling of foreign words, and also to rectify certain notable omissions.

C. J. W. H.

Manufacturers' Publications and Pattern Cards

The Society does not accept any responsibility with regard to the statements in the following notes.

Any publication abstracted may be referred to by members of the Society on application to
Dr. C. B. Stevens, Dyeing Department, Leeds University

Allied Colloids (Manufacturing) Co. Ltd.

Tetralon S— This is an approx. 30% aqueous solution of sodium ethylenediaminetetra-acetate. It is immediately miscible with water at all temperatures, and is unaffected by prolonged boiling under neutral, acid, or alkaline conditions. It is recommended as an addition to all processing liquors where sequestration of undesirable metal ions is required.

Badische Anilin- und Soda-Fabrik
Textile Auxiliaries— The following products are
described in separate leaflets giving details of the character, properties, application, and uses of each-

Albigen A -- A non-ionic polymerisation product having pronounced affinity for dyes and recommended as an addition to caustic soda-sodium hydrosulphite stripping baths for vat and sulphur dyes

Cyclanone WNL- A fatty alcohol sulphonate solventdetergent mixture.

Fibrit DP—A dye solvent for use in printing, Eunaphtol ASN—A wetting agent-protective colloid solvent mixture for use in azoic dyeing.

Glyccine A-A dye solvent for use in textile printing. Glyecine WD-A mixture of a product similar Glyecine A and an emulsifying agent to promote levelling. Recommended for direct printing on wool and discharge printing on continuous filament and spun rayon.

Leophen BN-A non-foaming wetting agent free from cresol for adding to mercerising liquors.

Lunetzol A-A non-foaming wetting and levelling agent.

Kaurit B Paste- A urea-formaldehyde condensation product for imparting crease resistance to cotton and linen goods.

Perapret A (formerly Appretan A)—A dispersion of plastics recommended as a pigment binder and finishing agent.

Ramasit III -- A softening and finishing agent for all types of textile materials.

Rongalite CW-A mixture of Rongalite C and zinc

oxide for discharge printing on wool and silk. Soromine A-A softening agent. Soromine HS-A highly substantive softening and

brightening agent. $Textile\ Wax\ W$ — A water-soluble wax for sizing and

finishing liquors. Trilon AO Powder-An organic sequestering agent for

metal ions.

Anthra Printing Black BG— This dye is recommended for direct printing on cellulosic fibres where bluish blacks of good fastness to light and wet treatments are required. Advantages claimed include consistency of hue and depth under widely different conditions of drying and

steaming; complete fixation with small amounts of Rongalite; and stability to overprinted Rongalite, which makes it particularly suitable for outlines. Fastness figures on cotton include-Light 6, washing at 100°c. 4, chlorine 3-4.

CELLITON FAST BROWN BG- This disperse dye is recommended for use alone and in mixtures on all forms of acetate rayon. It is also of interest on acetate rayoncellulosic fibre mixtures, since, although the latter is distinctly stained reddish brown, this stain can be eventually eliminated by the use of Blankit I. It is also of interest in direct printing, but not for discharge styles. The very violet brown dyeings obtained on nylon and Perlon are of little interest. Fastness figures include-Light 5, washing 3, perspiration 2-3.

CELLITON FAST GREY BG- Neutral greys showing no appreciable change in artificial light are obtained on acetate rayon with this disperse dye. It may be used on unions of acetate rayon and cellulosic fibres for obtaining small white effects if the yellow stain on the latter fibre is reduced by treatment with Blankit I. It is suitable for direct but not for discharge printing, and is not recommended for use on nylon or Perlon. Fastness figures include—Light 5-6, washing 4, perspiration 3-4.

INDANTHREN BORDEAUX B POWDER FINE FOR DYEING This brand gives dyeings identical in characteristics to those obtained using the older powder brand but is much superior in the fineness of the dispersions obtainable and in wetting and pasting properties, and it can be vatted much more rapidly.

INDANTHREN DARK BLUE DB POWDER- This vat dye is recommended for producing full dark blues on cotton cloth where the maximum fastness to light and wet treatments is demanded. Owing to its high rate of exhaustion, it is not recommended for pale dyeings or for use on regenerated cellulose rayons. Pigment padding is strongly advised for thick and tightly woven fabrics. Fastness figures include—Light 8, washing at 100°c. 4-5, chlorine

INDANTHREN GREY GG- This vat dye is offered as a Suprafix Double Paste brand for use in printing to produce greenish greys of excellent fastness to light. It is suitable for direct printing and for producing grey dis-charges and grey resists under Anthrasols and aniline black. It is not dischargeable, but white resists may be produced under it. Fastness figures on cotton include-Light 7, washing at 100°c. 4, chlorine 4.

INDANTHREN RED BROWN R-The Suprafix Paste brand of this vat dye supersedes the former Double Paste Fine brand, to which it is much superior in keeping qualities and ease of application. Fastness figures on cotton include- Light 6, washing at 100°c. 4, chlorine 4.

Cassella Farbwerke Mainkur

Indanthren Black Brown NT—This vat dye is recommended for use on cellulosic materials and silk by both the IN, IN Special, and IW methods to give beige to black-browns of very good fastness to light and wet treatments. Fastness figures on cotton include—Light 7, soda boiling 4-5, chlorine 4-5.

Indanthren Red GR—The Suprafix Paste brand of

INDANTHEEN RED GR—The Suprafix Paste brand of this vat dye may be printed direct on all types of cellulosic material without addition of Glyeeine A or prereduction to give full reds having excellent fastness to light and wet treatments. Fastness figures on cotton include—Light 6, washing at 100°c. 4–5, chlorine 5.

Indantheen Red Brown GD—Red-browns which are of good fastness and not liable to change of hue in artificial light are obtained using the Suprafix Paste brand of this vat dye. Prereduction is unnecessary. It is of interest for direct and coloured discharge styles and for coloured resists under aniline black and Anthrasols. Fastness figures on cotton include—Light 7, washing at 100°c. 4–5, chloring 4.

INDANTHREN YELLOW GGF—A Powder Fine for Dyeing brand of this vat dye is now available. It is more easily handled and has higher colour value than previous brands, while yielding reddish-yellow dyeings having the same fastness properties. Fastness figures on cotton include—Light 6, washing at 100°c. 5, chlorine 5.

INDANTHREN YELLOW 6GK—This vat dye gives bright greenish yellows of good fastness on all types of cellulosic materials. It may be used alone and in mixtures, particularly to give bright greens, for curtain and furnishing materials, since it does not promote tendering of cellulose on exposure to light. It is recommended for application by the IK method and also for pigment padding and the vat acid padding process. Fastness figures on cotton include—Light 6, washing at 100 °c. 4–5, chlorine 5.

Farbenfabriken Bayer

Benzo Fast Copper Bordeaux BLN— This direct dye is recommended for use on all types of cellulosic materials to give dyeings of good fastness to light and wet treatments when aftertreated on the fibre with Benzo Fast Copper Salt or copper sulphate. Fastness figures on cotton include—Light 6, washing at 140°F. 3-4, perspiration 4-5.

Sirius Supra Green 3G.— This direct dye gives bright greens of good fastness to light. The fastness to wet processing of dyeings is considerably improved by after-treatment with chromium fluoride or Levogen WW, the fastness to light being virtually unaffected by either treatment. A brand sufficiently free from copper and manganesse for use in conjunction with rubberproofing is available. Fastness figures of dyeings on cotton after-treated with Levogen WW include— Light 5, washing at 1645° A perspiration 5.

104°r. 4, perspiration 5.
SYNTHARESIN AST.—This is a water-soluble oil recommended for use on Perlon, nylon, and acetate rayon to eliminate electrostatic effects during processing.

Farbwerke Hoechst

Anthrasol Dyes on Bemberg (Cuprammonium)
Rayon—This card (German text only) shows twelve
solubilised vat dyes and twelve mixture dyeings on
bright and delustred cuprammonium rayon yarn.

PRINTS ON COTTON AND VISCOSE RAYON CRÉPE USING ANTHRASOL DYES—This card (German text only) contains prints in three depths on cotton and viscose rayon showing thirty-four dyes of the solubilised vat type. Each is shown developed by the sodium chlorate-steam and nitrite processes.

PRINTS ON COTTON AND VISCOSE RAYON CRÉPE USING INDANTHREN AND ALGOL DYES—This card (German text only) shows twenty-seven Indanthren and two Algol dyes printed in three depths on cotton and viscose rayon cloth.

INDANTHREN DYES: PRINTS FOR CURTAIN AND FURNISHING FABRICS—This card (German text only) contains prints in three depths on cotton and viscose rayon crêpe showing thirteen Indanthren dyes, alone and in two-and three-colour combinations.

INDANTHREN DYES ON COTTON CLOTH—This card (German text only) contains dyeings of thirteen Indanthren vat dyes.

Instructions governing the application of the "Indanthreen" Standard of Fastness to Dyeings of Anthrasol Dyes—Seventeen solubilised vat dyes are listed and shown as dyeings on cotton cloth in this eard (German text only). In five instances, additional dyeings are shown giving the minimum depth of dyeing to which the Indanthren standard of fastness may be given.

FAST-TO-LIGHT DYEINGS ON WOOL YARN—This card (German text) shows forty-one mixture dyeings of five Anthralan dyes, each mixture being shown in three depths using the same relative proportions of each component. Three dyeings of mixtures including Patent Navy Blue LE and one dyeing of Amido Black HTT are also included.

DIRECT DYES ON COTTON CLOTH—This card (German text) contains dyeings in two depths of four Remastral and six Dianil dyes. One of the latter, Dianil Dark Blue H extra, is shown dyed direct and also diazotised and developed with β -naphthol and Developer H respectively.

UNION DYES—The dyes in this card are arranged in three groups. Group I contains twelve dyes which will give solid dyeings on wool and cellulosic fibres from a dyebath containing Glauber's salt only. These include dyes from the Union Fast, Union, Universal, and Sirius Supra (i.e. fast to light) ranges. Group II contains six dyes, including members of the Dianil and Sirius Supra ranges, which dye cellulosic materials more deeply than wool from a neutral Glauber's salt bath. Group III comprises thirteen acid dyes for shading the wool under the same dyebath conditions.

Abstracts from British and Foreign Journals and Patents

The titles of abstracts may be modified. Abbreviations of names of firms are listed in J.S.D.C., 68, 23 (Jan. 1952); while other abbreviations and symbols, together with a list of the periodicals abstracted, will be found at the end of the annual index.

I-PLANT; MACHINERY; BUILDINGS

PATENTS

Conditioning or Tinting Yarn. C. F. Dulken, H. C. Sonntag, and G. Westwater. USP 2,598,239
Liquor, to be applied to the roll used in a winding

machine to rotate the package being formed, is first atomised by pressure reduction in a nozzle, and the resulting mist is formed into a sheet-like spray which is directed on to the roll.

C. O. C.

Producing Relative Motion between Liquids and Objects immersed in them. Ultrakust-Gerätebau Dr. Ing. Oswald Raudszus. BP 680,418

In washing, dyeing, etc. machines a magnetically vibrated agitator dips into the liquid and is excited at acoustic frequency. The agitator is connected by a driving

rod with the oscillating armature of an excitation system placed outside the liquor. The agitator is a rigid, completely closed hollow body unsupported except for its attachment to the driving rod. The excitation system is enclosed in a casing which can be detachably secured to the wall or rim of the dye vat or the like and is provided with means to support it in the bottom of the vat.

Continuous Wet Treatment of Freshly Spun Filaments. Algemene Kunstzijde Unie. BP 682,409 In apparatus where the filament passes with the aid

In apparatus where the filament passes with the aid of treating liquors through a series of tubes one above another, means are prayided when starting up the apparatus or if a filament breaks to lead the thread from one tube to the tube below it by the aid of a liquid.

C. O. C.

Squeeze Rollers for Pads, Mangles, etc. U.S. Secretary of Agriculture.

USP 2,596,154

Greater expression of liquor from and penetration into textiles is obtained if each squeeze roller has a hard core of diameter approx. 2½ in. with a coating of rubber ½ in. thick and of hardness 100–200 measured with a Pusey & Jones plastometer (½-in. ball). Such rollers are superior to all-metal or solid rubber rollers. C. O. C.

Treatment of Thread. Courtaulds. BP 681,401 In apparatus in which thread is passed in a number of spaced convolutions over and along a pair of rollers arranged with their axes out of parallel, the convolutions can be differentially spaced in zones along the rollers, thus reducing the total length of the rollers needed for adequate treatment with a number of liquids. C. O. C.

Thread-treating Machine. Dan River Mills.

In a machine for dipping, stretching, compressing, drying, and packing threads, particularly those formed of short fibres, e.g. cotton, spun rayon, flax, and jute, penetration of the impregnating agent and compression of the treated threads are simultaneously aided. The compression device is such that high tensile strength and low gauge of treated thread are obtained without the need for extreme tension hitherto necessary.

C. O. C.

Fabric Expanders for use with Jigs. F. Slater.

An expander roller has at each end a pinion which engages in a rack at the side of the jig, enabling the roller to be moved into pressure contact with the fabric at either side of the jig.

C. O. C.

Mercerising Tubular-knit Fabric. M. S. Dayan.

USP 2,597,572
The fabric is flattened and stretched both lengthways and widthways, and then kept under correct tension while being mercerised.

C. O. C.

Jig. Celanese Corpn. of America.

BP 682,025

Each roller is hydraulically braked, the brakes being automatically controlled by a sensing element whose position is determined by the tension in the fabric, so that the tension is kept constant.

C. O. C.

Suction Hydroextractor. BrC. BP 681,909–10 Increase in temperature of the fabric at the point of suction results in more water being removed. It may be achieved by applying radiant heat to the fabric immediately before the point of suction. The savings in subsequent drying are greater than the cost of the radiant heating. C. O. C.

Drive for Raising Machines. T. W. Riley (Rochdale).

RP 679.825

The drive for the pile and counter-pile rollers includes a fluid-operated variable-speed gear. This enables the speed of the rollers to be preset before the machine is started and for it to be adjusted while the machine is operating. Preferably the gear is provided with means to stop either the pile or counter-pile rollers without stopping the machine. C. O. C.

 $\begin{array}{cccc} \textbf{Dimensional Stabilisation of Tubular-knit Fabric.} \\ \textbf{F. R. Redman.} & USP \ 2,597,528 \\ & USP \ 2,597,530 \end{array}$

Residual shrinkage is reduced to a minimum by stretching the fabric to the width at which it was knitted and at the same time feeding it lengthwise in absence of lengthwise tension, the stretching being done in one or more stages.

C. O. C.

Relaxed Drying of Fabrics. F. R. Redman.

The fabric is hung in loops supported at both their upper and lower portions so as to provide discrete loop sections of the fabric free from tension. The loops are agitated during drying so as to ripple them. C. O. C.

Dimensional Stabilisation of Knitted and Woven Fabrics, F. R. Redman. USP 2,597,529

The moist fabric while completely relaxed is supported so as to form it into projecting or protuberant loops, which are repeatedly compressed during drying. Compression is preferably achieved by directing hot air under pressure against protuberant loops, the hot air also serving as the drying agent.

C. O. C.

Fabric Drying and Shrinking. Proctor & Schwartz. USP 2,597,490

In a loop drier provision of a conveyor to support the fabric in successive loops renders possible great simplification and reduction in cost of the apparatus. It is particularly suitable for tubular-knit fabric. C.O.C.

Web-handling Device. IC. USP 2,597,877
Machinery for handling readily distensible material, e.g. plasticised vinyl foil or wet-coated paper, so as to deliver wrinkle-free webs of controlled dimensions. C. O. C.

Web-coating Machine. Paper Patents Co. BP 680,570 A machine for obtaining, on a paper web, an all-over, smooth, evenly distributed layer of an aqueous coating composition, containing a mineral pigment and an adhesive, comprises a pair of pressure rolls, an outer roll, and a valve rolk. One of the pair of rolls is a coating applicator roll which receives a limited supply of the coating mix and conveys it all through the applicator nip and on to the web. The valve roll contacts both outer and applicator rolls, forming a valve nip with the former and a transfer nip with the latter. Pressure is exerted on the outer roll to cause sufficient coating mix to pass through the valve nip for the coating operation. The diameters and hardness of the pair of pressure rolls are such that the maximum pressure in the valve nip is at least as great as the maximum pressure in the transfer nip. The outer roll may be rubber-covered, and the valve roll, of smaller diameter, of metal. The outer and applicator rolls are of approx. the same diameter, the surface of the former being at least as hard as that of the latter.

Spreading Liquid or Plastic Materials on Travelling Webs. Industrial Insulations. BP 681,278 A spreading machine which coats the web on both sides during one pass through. C. O. C.

Trimming the Edges of Continuous Lengths of Material. Dunlop Rubber Co. BP 681,000

When excess rubber or other coating material is being trimmed from the edges of fabric, the position of the trimming knives is automatically controlled according to variations in the position of each selvedge. C. O. C.

Stamping Apparatus. Tootal Broadhurst Lee Co.

RP 680.706

The stamping head of a machine for printing or perforating, e.g. the selvedge of a fabric, is mounted so that it can move across the path of the fabric so as to follow variations in the position of the selvedge. C. O. C.

Laundry Presses. Weston Laundry Machine Co.

BP 681.831

A simple and inexpensive device for rapidly stopping the turntable which brings the work-receiving tables under the press head.

C. O. C.

Detecting Inequalities of Thickness in Sheets and Yarns. Robbins Mills. BP 682,549

Sheet material or one or several parallel strands are passed through the apparatus. A projection appearing on the surface of the web or strand completes an electric circuit, which either stops the machine or warns the operator.

C. O. C.

III—CHEMICALS; AUXILIARY PRODUCTS; FINISHING MATERIALS

Stability of Metal Chelates. I— Iminodiacetic and Iminodipropionic Acids.
 S. Chaberek and A. E. Martell. J. Amer. Chem. Soc., 74, 5052–5056 (20 Oct. 1952); II— β-Hydroxyethyliminodiacetic Acid.
 S. Chaberek, R. C. Courtney, and A. E. Martell. Ibid., 5057–5060.

I— Measurement of the acid dissociation constants of the two acids and the chelate stability constants of the corresponding anions with cupric, nickelous, cobaltous, zinc, and cadmium ions at 30°c. and 0·1 ionic strength shows that replacement of acetate groups by β -propionate groups in the sequestering agent results in considerable decrease in stability of the chelate.

II — Similar measurements with β-hydroxyethyliminodiacetic acid and bivalent Ca, Mg, Mn, Pb, Cd, Zn, Co, Ni, and Cu and approx. hydrolysis constants of the bivalent ions show that the relative values for the first chelate formation are—Cu > Ni > Pb > Zn > Co > Cd > Mn >Ca-while the corresponding values of the second formation constant in order of decreasing stability are-C. O. C. Cd > Co > Cu > Pb > Zn > Mn.

PATENTS

Sulphonated Phenylalkane Detergents. California USP 2,597,834 Research Corpn. Removal of the unstable constituents from the olefinic mixtures derived by cracking petroleum fractions, which mixtures are used for alkylating aromatic hydrocarbons, results in much cheaper products, and these when sulphonated yield wetting agents and detergents having superior properties to those obtained by use of the untreated olefinic mixtures. C. O. C.

Oxyalkylated Derivatives of Trinuclear Aromatic Compounds --- Auxiliary Agents. Petrolite Corpn. USP 2,598,234

Compounds of formula-

 $\begin{array}{ll} (R^1=Alk,\,aralkyl,\,cycloalkyl,\,or\,Ar\,of<9\,C;\,\,R^2\,and\,\,R^3\\ =Alk,\,\,aralkyl,\,\,cycloalkyl,\,\,or\,\,Ar\,\,of<19\,\,C;\,\,R^4=\\ \text{ethylene,}\,\,propylene,\,\,butylene,}\,\,hydroxypropylene,\,\,or\,\,&\\ \end{array}$ hydroxybutylene; n = 1-20, there being ≤ 2 mol. of alkylene oxide for each phenolic nucleus) are useful wetting, detergent, and levelling agents.

Lubricant for Acetate Rayon. Celanese Corpn. of BP 681,033

A lubricant for acetate rayon is compounded from (a) a mineral oil, (b) an aryl phosphate (e.g. tricresyl phosphate), (c) a long-chain fatty acid (e.g. oleic acid), (d) a hydroxyalkylamine (e.g. triethanolamine), and (e) the constituents of a mixture obtained by desalting and dehydrating the alkali-neutralised reaction product of oleum with a mixture of a long-chain fatty acid, a vegetable oil (e.g. raw peanut oil), and a mineral oil.

Antistatic Agent. American Cyanamid Co.

USP 2,597,708 Guanidine alkyl sulphates, particularly those in which the alkyl contains 12-18 C, are excellent antistatic agents.

Antistatic Agents for Polyethylene Fibres, etc. DuP BP 681,517

Compounds of formula $R \cdot O \cdot [CH_2 \cdot CH_2 \cdot O]_n \cdot H$ (R = a benzene ring subst. at least once by Alk or cycloalkyl; n = 6-25) are good antistatic agents for use on polyethylene, 4-20 mg./sq. yd. of surface being used. C. O. C.

Size for Yarns. Ilford. BP 682,386 A complex formed between gelatin or other colloidal protein and an anion soap or an organic sulphonic acid containing a highly hydrophobic radical dissolved in an organic solvent is an excellent size for yarns, particularly those of nylon or other strongly hydrophobic fibre.

C. O. C. Fatty Acid-Polyglycol-Aliphatic Amine Combinations useful as Softening Agents. Arkansas Co. USP 2,596,985

The products obtained by heating a monocarboxylic fatty acid of 12-24 C first with a polyethylene glycol of mol, wt. 400-1500 and then with a water-soluble aliphatic amine containing > 1 NH2 group or one NH2 group and one or more OH groups are cationic softening agents.

Water-soluble Urea-Aldehyde Condensates. Deutsche Gold- und Silber-Scheideanstalt vormals Roessler.

BP 679,758 Compounds of formula H₂N·CR¹·NR²·R³ (R¹ = 0, 8, or NH; R² and R³ = H, Alk, alkenyl, Ar, aralkyl, or acyl) are treated at 80–110°c., under alkaline conditions and in absence of aldehydes, with ammonia or compounds

of formula NR1R2R3 (R1, R2, R3 = H, Alk, OH, hydroxyalkyl) and then condensed with aldehydes. products are soluble in water in all proportions to form stable solutions, and can be hardened in the usual way in presence of acid catalysts. They have a wide variety of uses as finishing agents for textiles and leather. C. O. C.

Urea-Aldehyde Compositions containing Latent Curing Catalysts. J. Marian. BP 682,677 Compounds which upon dissolution produce at least two

protolytic systems of conjugate pairs of acids and bases, one system having hydrogen perdisulphate ion as conjugate acid and the other at least one conjugate base capable of being decomposed and/or condensed into the resin when heated, are excellent latent curing catalysts for urea-aldehyde condensates. The above or another conjugate base has pK_a 11, and the compounds are such that the pH of the solution is kept at 5.5–9.0. Such catalysts neither affect the primary condensate, nor introduce large amounts of electrolytes into the solution, nor prevent plastic flow of the resin during hardening; in addition, during curing they lower the pH to the value required in the final product. COC

Organosilicon Compounds. Cowles Chemical Co.

BP 675,188 BP 675,233

Alkali-metal salts of alkyl- and alkenyl-silanetriols and -siloxanols are water-soluble wetting and detergent agents. Acidification or dilution, preferably accompanied by heating of their aqueous solutions, produces silicones. They can be used for producing durable, resistant, and water-repellent finishes. C. O. C.

Synthetic Tanning Agents. Forestal Land, Timber &

Railways Co. BP 681,266 The water-soluble sulphonation products of waterinsoluble aliphatic aldehyde-aliphatic ketone condensates have good tanning properties.

Flame- and Glow-proofing Compositions. Monsanto. USP 2,596,936

Resinous flameproofing compositions employed in combination with an otherwise combustible base may be made with a negligible afterglow period if they include polyphosphorylamide (obtained by treating phosphoryl chloride with ammonia).

USP 2,596,937 Fire-retarding compositions of great stability are pro-

vided by combination of an aminoplast resin and polyphosphorylamide or similar compound containing N

The composition may include a water-soluble alkyd resin, e.g. from an a-hydroxypolycarboxylic acid and a polyhydric aliphatic compound.

USP 2.596.939 Compositions containing an aminoplast resin, polyphosphorylamide or similar compound, and a polyhydric alcohol, e.g. mannitol, sorbitol, or pentaerythritol, there being 1-10% of the last on the weight of the resin.

C. O. C. Aqueous Acid Fluoride Compositions as Rust and Stain Removers. Pennsylvania Salt Manufacturing BP 681.01)

Compositions containing 5-60% by weight of total HF equivalent (including both free and combined HF) and in soln. 0·25–15·0% by wt. of a C_1 – C_{10} aliphatic wetting agent containing a hydrophilic O-containing group (except COOH), e.g. β -butoxyethyl alcohol, are used. C. O. C.

Binder for Fabric-coating Compositions. BP 682,078 and S. A. Cohen.

A binder for coating fabrics intended as floor coverings, etc. is obtained by treating an oil-soluble heat-reactive phenol-formaldehyde condensate (1-6 parts by wt.) at 300-400°F. with a mixture (28) of rosin acids (25-75%) wt.) and unsaturated high-mol.wt. fatty acids (75-25%). The acid number of the product is brought below 10 by adding a polyhydric alcohol, and the whole heated to $400-575^{\circ}r$, after which a drying oil is added. This mixture is then bodied, by heat-polymerisation or airblowing, into a cementitious gel resistant to solvents, C. O. C. greases, oils, acids, and alkalis.

IV—RAW MATERIALS; INTERMEDIATES; COLOURING MATTERS

Auxochromic Effect of the Dimethylamino Group and its Coplanarity with the Benzene Ring. A. I. Kiprianov and I. N. Zhmurova. Doklady Akad. Nauk S.S.S.R., 85, 789-791 (1 Aug. 1952).

Twelve thiacarbocyanine dyes of formula-

$$\begin{matrix} R^{a} \\ R^{i} \end{matrix} \begin{matrix} S \\ \vdots \\ N \end{matrix} \begin{matrix} S \\ C \\ CH: CH: CH: CH \end{matrix} \begin{matrix} S \\ \vdots \\ N \end{matrix} \begin{matrix} R^{i} \\ \vdots \\ R^{a} \end{matrix} \begin{matrix} R^{i} \end{matrix}$$

(R¹ = H, NH₂, NH-CO·CH₃, or N(CH₃)₂; R² = H, CH₃, or C(CH₃)₂; R³ = CH₃ or C,H₃; X = anion) are prepared, and their spectral characteristics are determined. When R² = H, the effect of replacing R¹ = H ffst by NH-CO·CH₃, then by NH₂, and finally by N(CH₃)₂ is to increase the wavelength $\lambda_{\rm max}$ at the absorption max. by an increasing amount. When R¹ = NH-CO·CH₃ or NH₃, the effect on $\lambda_{\rm max}$ of varying R² is very small; but when R¹ = N(CH₃)₂, replacement of R² = H by Alk leads to a great reduction in $\lambda_{\rm max}$. Introduction of R¹ = N(CH₃)₂ into the parent thiacyanine leads to a fall in the molar extinction coeff., but with the further introduction of R² = Alk the molar extinction coeff. partly recovers its original value. Introduction of the ortho alkyl group is analogous in effect to salt-formation at the N(CH₃)₂, which leads to complete recovery of the spectral characteristics of the parent thiacyanine. The effects observed are attributed to deflection of the N(CH₃)₂ from the plane of the benzene ring under the influence of an ortho alkyl group.

Effect of Steric Hindrance on the Colour of 5:6:5':6'-Tetrasubstituted Thiacarbocyanines.
I. I. Levkoev, N. N. Sveshnikov, and N. S. Barvyn. Doklady Akad. Nauk S.S.S.R., 85, 805-808 (1 Aug. 1952).

Absorption spectra are determined for thiacarbocyanines of the type investigated by Kiprianov and Zhmurova (see above—R¹ = H or O·CH₃; R² = H, NH₄, NH(CH₃), N(CH₃)₂, NH·CO·CH₃, N(CH₃)·CO·CH₃, NH·CO·CH₃, N(CH₃)·CO·CH₃, NH·SO₂·C₄H₄·CH₃(p), or N(CH₃)·SO₂·C₄H₄·CH₃(p); R³ = C₂H₃). Introduction into the parent thiacyanine of O·CH₃ in the 5:5′-positions or of the groups indicated in the 6:6′-positions leads to bathochromic effects, and, providing that R² is not N(CH₃)₃, 5:5′:6:6′-substitution leads to still greater bathochromic effects, the magnitudes of which can be calculated with good accuracy on the basis of simple additivity. However, on introducing R¹ = O·CH₃ into the 6:6′-bisdimethylaminothiacyanine, there is a hypsochromic shift of 8 mµ. instead of the calc. bathochromic shift of 19 mµ. This exceptional behaviour is explained by steric interaction between N(CH₃)₂ and o·O·CH₃, leading to deflections of the groups from the plane of the benzene ring and hence reduced electronic interaction with the chromophoric system.

A. E. S.

Production of Pigments similar to those from Hair by Interaction of Amino Acids and Keratin. B. L. Hanna. Proc. Soc. Exptl. Biol. Med., 80, 285-287 (1952): Chem. Abs., 46, 9131 (10 Oct. 1952). The soluble pigments produced when defatted nail

The soluble pigments produced when defatted nail keratin and tyrosine or tryptophan are boiled together with mineral acids differ from those produced when the keratin or amino acid is treated separately. The pigment produced by boiling keratin and tryptophan in 6 s.-HCl shows an absorption spectrum similar to that of the pigment trichosiderin (from hair) but contains no Fe.

Ferrichrome—a Crystalline Organo-iron Figure from a Rust Fungus (Ustilago sphærogena). J. B. Neilands. J. Amer. Chem. Soc., 74, 4846–4847 (5 Oct. 1952).

It is proposed to call a crystalline organo-iron pigment produced by *U. sphærogena* ferrichrome. Its structure has not yet been elucidated, but all available evidence indicates that it is not directly related to the porphyrin saries.

C. O. C.

PATENTS

Metallisable Monoazo Wool Dye. General Aniline. USP 2,598,661

The monoazo compound 2-amino-4-chlorophenol-6-sulphonic acid→1-o-carboxybenzoylamino-7-naphthol may be metallised (especially with chromium) in substance, on the fibre, or in the dyebath, to give dyeings which retain their tone under artificial light. Afterchromed dyeings are bluish black, and metachrome dyeings bluish grey. E. S.

Red Monoazo Pigments. American Cyanamid Co. USP 2,598,483

Alkali and alkaline-earth metal compounds of the monoazo compound—

are red toners, particularly suitable for imparting a yellowish shade to lithol reds, and are faster to light than the related pigments having CH_2 in place of the $\mathrm{C}_2\mathrm{H}_2$. Thus, ethylbenzene is sulphonated at $90\text{--}116^\circ\mathrm{C}_2$, to yield the p-sulphonic scid. Sulphuric acid and ferric chloride are added to the reaction mixture, and chlorine gas is passed in. When the reaction is complete, excess chlorine is removed by air-blowing, and nitric acid run in at $25\text{--}30^\circ\mathrm{c}$. The nitro compound is reduced with iron and acetic acid, to yield 5-amino-2-chloroethylbenzene-4-sulphonic acid, which is diazotised and coupled with β -naphthol. The sodium salt is obtained by addition of NaOH, followed by neutralisation with acetic acid, and may be converted to the Ba or Ca toner by reaction with BaCl₂ or CaCl₂ respectively. E. S.

Groups. Eastman Kodak Co. USP 2,594,297

Monoazo compounds-

 $\begin{array}{lll} (\mathbf{R}^1 = \mathbf{CH}_2 \cdot \mathbf{CH}_$

Disperse Azo Dyes derived from Condensation Products of Aromatic Amines and Chlorinated Paraffins. Diamond Alkali Co. USP 2,593,406

Chlorinated paraffins of 18–36 C condense with aromatic amines, in presence of AlCl_s if necessary, to form products of unknown constitution, which can be diazotised and coupled with aromatic amines, phenois, and naphthols to yield azo dyes. Thus, all parts being by weight, chlorinated paraffin wax (190), containing 30% combined chlorine, is stirred under reflux with aniline (300) for 8 hr. After filtering off, the product is subjected to steam distillation in presence of NaOH to remove unchanged aniline. The residue is treated with nitrous acid, and the diazo compound so formed coupled with β -naphthol. The product dyes acetate rayon and wool orange from an aqueous dispersion. E. S.

Azoic Dyes from Aryl Sulphonhydrazides. General Aniline. USP 2,593,930

Aryl sulphonhydrazides Ar·NH·NH·SO₂·R (R = Alk or aryl) combine with azo coupling components in presence of oxygen or air and steam to give azo compounds, and hence may be used in the production of azoic dyeings and prints. Thus, a soln. of phenyl p-acetylaminobenzene-diazosulphone (15·2 g.) in dimethylformamide (100 c.c.),

glacial acetic acid (5.8 c.c.), and water (5 c.c.) is treated at < 40°c, with zine dust to give the sulphonhydrazide-

A printing paste is prepared by pouring a soln. of this product (0·25 g.) in dimethylformamide (4 c.c.) into a mixture of starch tragacanth (22 g.) and water (4 c.c.), and is screen-printed on a textile fabric which has been impregnated with the Na salt of the β -naphthylamide of 3:2-hydroxynaphthoic acid. Steaming for 10–20 min. in presence of oxygen develops the red azoic print. E. S.

Water-soluble Non-diffusing Dyes for Colouring Light-sensitive Emulsions. B. Gaspar,

BP 682,665 Water-soluble dyes of high mol. wt. containing at least one solubilising group and, omitting any terminal present, of formula $[B:[R^1:N:N]_a:R^2]_n$ (R^1 and R^2 = residues of a diazo compound and an azo coupling component respectively; B = a conjugation-interrupting bond connecting two dye units; n > 1; a = 1-4; $a \times n > 2$) are non-diffusing dyes for colouring photographic emulsions. Photographic layers coloured with such dyes are particular. larly useful for producing dye images by local destruction of the dye, e.g. by the process described in USP 2,020,775.

Brown, Metal-complex Azoic Dyes. Pharma Chemical BP 681,385

The dinitrosodisazo compound-

is coupled on the fibre with 2 mol. of a diazo compound (or I mol. of a tetrazo compound) free from solubilising groups in presence of a water-soluble salt of Cr, Cu, or Ni, to yield in presence or a water-soluble sait of Cr, Cu, or Ni, to yield brown azoic dyeings or prints. Thus, N-acetyl-p-nitro-o-aminophenol is reduced to the p-amino compound, 2 mol. of which are condensed with 1 mol. of COCl₁ to give the urea derivative. Treatment with nitrous acid after deacetylation gives 4:4'-dihydroxy-5:5'-dinitrosodiphenyl-urea-3:3'-bisdiazonium chloride, which couples with resorcinol to give (I). The diazoamino compound derived from diazotised o-aminodiphenyl ether and proline is mixed with (I), and β -ethoxyethyl alcohol and aq. NaOH are added to give a clear brown soln., which is thickened with starch tragacanth paste. Sodium chromate soln, is then added, and the resultant paste is printed on to cotton cloth. Upon steaming, a brown metal complex, of "probable" formula-

is fixed on the fibre.

Dyes for BP 681,653 Metal(Chromium)-complex Azo

E. S.

Nylon and Wool. DuP. BP 681,653
The monoazo dyes made by diazotising a 2:5-dialkoxyaniline (or a sulphonamide thereof) and coupling with 2-naphthol (or a 6- or 7-sulphonamide thereof) are made into Cr complexes under such conditions that the O-Alk groups ortho to the azo links are dealkylated, and 2 mol. of monoazo compound combine with 1 atom of Cr. products are greenish-blue dyes for nylon and wool. Thus, the monoazo compound 2:5-dimethoxyaniline $\rightarrow \beta$ -naphthol (350 g.) is added to ethylene glycol (5 litres) containing chromic acetate (CH₃·COO)₂Cr,H₂O (240 g.). The mixture is stirred at $140-160^{\circ}$ C, and maintained slightly alkaline by addition of NaOH (ca. 60 g.) as a 30% solu. After 8 hr. the product is isolated by pouring the reaction mixture. Thus, a mixture of quinizarin, leuco-quinizarin, and borio

into 2% aq. NaCl (cu. 15 litres). The product is assigned the formula-

Metal-complex Trisazo Dyes for Cotton. Ciba. BP 682,024

Metal (especially Cu) complexes of trisazo dyes-

(R1 = subst. or unsubst. salicylic acid residue; R2 = arylene in which the CO group is meta or preferably para to the azo link; R3 = arylene of the benzene series in which the NH group is *meta* or preferably *para* to the azo link; $R^4 = \text{aryl}$ of the banzene series carrying OH or O.Alk ortho to the azo link) are mainly brown cotton dyes. Metallisation may be carried out on the fibre or in the dyebath, but is preferably carried out on a metallisable intermediate product formed in the course of making the dye rather than on the trisazo compound, so that metallisation occurs at the oo'-dihydroxyazo or oo'-alkoxyhydroxyazo group and not in the salicylic acid residue. Products containing only one sulpho group (e.g. in R⁴) are particularly valuable. Thus, tetrazotised 4:4'-diaminobenzanilide is coupled first with 1 mol. of salicylic acid and then with 1 mol. of the copper complex of the monoazo compound 2-aminophenol-4-sulphonic acid-resorcinol to yield the yellow-brown direct cotton dye-

a-Amino-β-cyanoanthraquinones - Acetate Rayon

Dyes. Celanese Corpn. of America. USP 2,587,002 1-Amino-2-cyanoanthraquinones carrying NHR at position 4 (R = H, Alk, Ar, aralkyl, or hydroaryl) and Hal, NH₃, or NHAlk at 5 or 8 are blue dyes for cellulose esters fast to gas fumes. They are made e.g. by refluxing 1-amino-4-bromo-5-chloroanthraquinone-2-sulphonic acid with p-toluenesulphonamide, Na₂CO₃, and a Cu salt for 5 hr. After hydrolysing in conc. H₂SO₄ at 60°c, the resulting compound is heated with aq. KCN at 85°c, for 5 hr. to give the blue dye-

a-m-Hydroxy(and Alkoxy)alkylphenylaminoanthraquinones -- Acetate Rayon Dyes. General Aniline. USP 2,585,681

a-Substituted (especially a-hydroxylated) quinones are condensed with an amine of formulaanthra-

$$H_3N$$
 $CH_4\cdot O\cdot CH_4\cdot CH_4\cdot O\cdot Z$
 X

(X = H or CH_a ; Z = H, hydroxyalkyl, or alkoxyalkyl; and R = H or $CH_a \cdot C \cdot H_a \cdot C \cdot L_a \cdot$ acetate rayon dyes fast to light, washing, and gas fumes. acid is heated at 90–95°c, for 16 hr, with β -m-amino-benzyloxyethanol in Cellosolve to give the blue–green dve—

R. K. F.

Anthraquinone-Thiazole Vat Dyes containing an Azo Group. DuP. USP 2,587,908

Group. DuP. USP 2,587,908 USP 2,559,669 (J.S.D.C., **68**, 273 (July 1952)) and BP 675,149 (J.S.D.C., **68**, 407 (Oct. 1952)) are extended to include the corresponding thiazole compounds and β-monohalogeno derivatives. Thus, the hot- or cold-dyeing yellow vat dye—

is prepared by heating 4:4'-azodiphenyl-4'':4'''-di-carboxylic dichloride and 2-aminoanthraquinone in nitrobenzene at 140°c. for 6 hr. After cooling, the Na salt of 2-amino-1-mercaptoanthraquinone is added, and heating resumed for 1.5 hr. at 210° c. R. K. F.

Anthraquinonoid Wool Dye. General Aniline.

washing, of formula-

USP 2,585,682 USP 2,585,682 condensed with N-(5-amino-2-methylbenzyl)formamide at 80–90°c, in water containing NaHCO₃ and a Cu salt. After hydrolysing in dil. HCl to remove the formyl radical, the resulting product is condensed with a second mol. of 1-amino-4-bromoanthraquinone-2-sulphonic acid to produce a blue neutral-dyeing wool dye fast to light and

R. K. F.

Halogenophthalimidomethylbenzanthrones. General Aniline. USP 2,584,367

An N-hydroxymethylphthalimide, which may be substituted in the benzene nucleus, is condensed with 3-bromoor 3-chloro-benzanthrone in 96% H₂SO₄ at $80^{\circ}c$, to produce a 3-halogeno-9-phthalimidomethylbenzanthrone—

The phthalimidomethyl group is converted into $\mathrm{CH_3}$ when this compound is condensed with 1-aminoanthraquinone and cyclised to a vat dye of the Olive Green B type. USP 2,584,368

Benzanthrone derivatives unsubstituted in the 3-position, e.g. 9-chlorobenzanthrone, are treated as in the preceding patent to give the 3-phthalimidomethylbenzanthrones. B. K. F.

Polynuclear Nitrogen-containing Vat Dyes. Basf.

BP 680.511

Amino or imino groups are introduced into polynuclear compounds containing at least one CO or CN group by treating with a hydroxylamine derivative in a molten mixture of $\mathrm{AlCl_2}$ and an alkali or alkaline-earth salt. Thus, hydroxylamine hydrochloride is slowly added to a mixture of isodibenzanthrone, $\mathrm{AlCl_2}$, NaCl , and KCl at $105{-}110^\circ\mathrm{C}$. The product is a violet vat dye. R. K. F.

Polychlorophthalocyanines. DuP. USP 2,586,598 Chlorophthalocyanines containing 12–15 Cl per mol. are made by treating a metal-free or a Cu phthalocyanine carried on a substrate of NaCl in a fluid-bed reactor with Cl₂ or mixtures of Cl₂ with an inert gas, e.g. N₃. The phthalocyanine–NaCl mixture is prepared by ball-milling a mixture of the phthalocyanine with 2–3 times its weight of NaCl. The Cl₂–N₂ mixture acts as the fluidising gas, mixtures containing 2% and over of Cl₂ at 200°c. being employed for the lower, and those containing 80–100% Cl₂ at 400°c. for the higher halogenated products. R. K. F.

Polymethin Dyes. Ilford. BP 681,451

Dyes of formula-

 $R^1 \cdot N \longrightarrow C:CH \cdot C(X \cdot R^2):CH \cdot CH \cdot CY \cdot CN$

(\mathbf{R}^1 and \mathbf{R}^2 = same or different Alk or aralkyl; \mathbf{D} = atoms to complete a subst. or unsubst. thiazole nucleus; $\mathbf{X} = \mathbf{O}$ or \mathbf{S} ; $\mathbf{Y} = \mathbf{C}\mathbf{N}$ or \mathbf{COOR}^3 ; $\mathbf{R}^3 = \mathbf{Alk}$ or aralkyl) are photographic sensitisers.

Unsaturated Ketonic or Thione Dyes having Terminal Heterocyclic Basic Nuclel. Ilford. BP 681,390 BP 681,736

Dyes of formula-

(R¹ and R² = same or different Alk, hydroxyalkyl, or aralkyl; Q = O or S; D¹ and D² = same or different atoms to complete a 5- or 6-membered heterocyclic ring or (when Q = S) a benzothiazole, a naphthothiazole, or an indolenine ring; n, m, x = same or different 0 or 1) are photographic sensitisers. C. O. C.

Polymethin Heterocyclic Cyanoesters having an Amino Substituent in the Polymethin Chain.

Ilford. BP 681,738

Dyes of formula-

..... D;

couplers of formula-

 R^{1} · \dot{N} · $(CH:CH)_{n}$ · $\dot{C}:CH$ · $(CH:CH)_{x}$ · $C(NHR^{2})$:C(CN)· $COOR^{0}$

(R¹ and R² = same or different Alk or aralkyl; R² = H, Alk, or aralkyl; D = atoms to complete a 5· or 6-membered ring; n and x = same or different 0 or 1) have photographic sensitising properties. \qquad C. O. C.

Dyes of Narrow Absorption Spectrum. Gevaert. BP 681,915

Dyes having narrow absorption spectra as well as dye images of hard gradation are obtained by the process of BP 636,988 (2.8.D.C., 66, 450 (1950)) when in the colour

the H atom linked to an N in Y, in the 3-amino substituent, or in the 2-position of the pyrazolone ring is substituted by Alk, Ar, acyl, or a heterocyclic group.

Carbon Black. Columbian Carbon Co. USP 2,597,232-3

A new method of making furnace black. C. O. C. Furnace Blacks. Columbian Carbon Co.

Method and apparatus for continuous production of "high-structure" furnace blacks. C. O. C.

Red Lead. National Lead Co. USP 2,597,645
Red lead is rendered more stable on storage and more
resistant to weathering by treating it with chromic acid
so as to convert any litharge present into lead chromate.

Diazotype Compositions containing Unsaturated N-Alkyl Derivatives of Aminodiazo Compounds (IX p. 37). Organic Pigments and Moulding Powders (XIII p. 39).

V-PAINTS; ENAMELS: INKS

PATENTS

Printing Inks. A. F. Schmutzler. Inks containing as binder the reaction product of shellac with a polybasic acid and as vehicle a low-mol.wt. poly-hydric alcohol containing 2-3 hydroxy groups do not harden on the press, but harden rapidly on steaming, heating, or ageing. C. O. C.

Silicone Resin Coating Composition. Glidden Co. BP 682,348

Production of an alkyd-modified polysiloxanol coating composition, which at high temperatures yields a film com posed essentially of silicones and which remains hard and glossy even when kept for a long time at 500°F. C. O. C.

VI -FIBRES; YARNS; FABRICS

Etherification of Cellulose. II — Reactivity of Sodium Cupricellulose. S. Rydholm. Svensk Papperstidning, 55, 661–664 (15 Sept. 1952).

The probable structure of Na cupricellulose is of the same nature as that of alkali cellulose but with all 6-hydroxyls and every second 3-hydroxyl inactivated by complex formation with the cupric ion. The accessible OH groups all react at the same rate, and thus the 2-hydroxyls which have reacted will represent two-thirds of the total degree of substitution. The initial period found in the etherification of alkali cellulose, during which only 6-hydroxyls are substituted, does not occur with Na cupricellulose, as the 6-hydroxyls are blocked. A structure for the cuprammonium-cellulose complex analogous to that given for Na cupricellulose is suggested.

Action of Bromine Water on Wool and other Animal Hairs. M. Leveau, J. Langlois, and A. Parisot. Bull. Inst. textile France, (34), 9-14 (Aug. 1952).

Whilst with chlorine water attack is limited to the epicuticle, bromine water can attack the cuticle also.

PATENTS

Pigmented Rayon. Oscar Kohorn & Co.

USP 2,598,066 A stable slurry of delustring agent or pigment is injected into the spinning solution between the stock tank and the spinnerets, the rate of injection being automatically controlled by the flow of the spinning solution. C. O. C.

Crimping Fibres. Alexander Smith & Sons Carpet Co. BP 682,263

Natural or man-made fibres are permanently crimped by gripping them between conveyors, which discharge and force the fibres into a zone against a mass of fibres compressed under pressure. The mass of fibres so crimped is kept compressed under constant pressure and treated with an agent to set the crimp.

Vinylidene Cyanide Copolymers (XIII p. 39).

VII—DESIZING; SCOURING; CARBONISING: BLEACHING

PATENTS

Bleaching with Aqueous Chlorites. Mathieson Chemical Corpn. BP 682,694 Addition of hydrofluoric acid or of its acid or neutral salts to aqueous chlorite solutions results in much improved

bleaching, and no chlorine dioxide is liberated into the atmosphere.

Bleaching Chemical Pulp. Buffalo Electro-Chemical BP 681.661

Unbleached sulphite wood pulp is given moderate to high brightness, the fibres having unimpaired or improved physical properties, e.g. tensile strength, burst, tear, and cuprammonium viscosity, by adding sufficient alkaline peroxide soln. to give a consistency of 20–65%, and to produce a content (on the dry pulp) of 0·3–1·75% $\rm H_2O_2$ and 0·75–3·25% total alkali (as NaOH), and keeping the fibres damp and at > 20% consistency for 1–20 days at $< 130^\circ\mathrm{F}$. Alternatively 0·75–1·25% $\rm H_2O_3$ and 1·0–2·5% total alkali (as NaOH) may be applied similarly for 1–20 days or until maximum brightness is attained.

VIII-DYEING

PATENTS

Molten-metal Dyeing Machine. Standfast Dyers &

In dyeing machines of the type described in BP 620,584 (J.S.D.C., 65, 412 (1949)), the material is heated so that it enters the metal bath above the freezing point of the metal. This prevents particles of the metal from forming on the material and interfering with level dyeing. C. O. C.

Dyeing with Vat Dyes susceptible to Over-reduction. RP 679.893 American Cyanamid Co.

Vat dyes susceptible to over-reduction can be applied at high temperatures if in addition to the alkali and reducing agent there is present in the vat not <25% on the wt. of dye of (1) a compound in which an N atom is covalently linked to O and by at least one valence to an element other than O or N but excluding tertiary amine oxides and compounds in which the linking between N and O is ionic, or (2) an inorganic nitrite, or (3) an inorganic halogenate.

Dyeing with Pigments. Dan River Mills. USP 2,596,192 Impregnation with (1) resin condensates in monomeric or incompletely polymerised form, or (2) such compounds as formaldehyde, glyoxal, etc., if necessary together with a catalyst, and then heating to cause polymerisation or reaction with the fibre, results in deeper and more brilliant coloration on subsequent application of resin-pigment compositions, the increase in depth and brilliancy being proportional to the solid resin in the fibre or the extent of reaction between the fibre and the compound with which it has been treated. Mixed fabric, e.g. rayon-cotton or nylon-acetate rayon, pretreated in this manner gives solid dyeings with resin-pigment compositions. C. O. C.

Mélange Effects on Wool by Dyeing or Printing. Fosse Dyeworks. BP 680,862

Use of dye liquors or printing pastes containing (1) a dye containing at least two sulphonic acid groups in the molecule, (2) acetic and/or hydrochloric and/or sulphuric and/or phosphoric and/or lactic acid and/or one or more ammonium salts of such acids, and (3) a condensate of an aldehyde with an aromatic sulphonic acid or a salt thereof or a water-soluble formaldehyde-urea or -melamine condensate, or a tannin or a sulphonic acid or sulphonate containing at least three sulphonic acid groups, yields ingrain or fleck effects similar to those obtained with mixed dyed and undyed wool. Multicoloured mélange effects are produced if there are also present in the liquor or paste dyes having affinity for wool but containing no or only one sulphonic C. O. C. acid group.

Dyeing Cellulose Esters and Ethers with Vat Dyes.

Celanese Corpn. of America. BP 681,654 A wide range of vat dyes can be applied to cellulose esters and ethers by mechanically impregnating them with an aqueous dispersion of the free leuco compound of the dye, drying, then impregnating with an aqueous solution of a formaldehyde-sulphoxylate containing an alkalimetal carbonate, steaming, and finally oxidising. Dyeings of good fastness to washing, light, and rubbing are obtained on acetate rayon with little saponification of the C. O. C.

Reserving Nylon when mixed with Natural Protein

Treatment of nylon before or during dyeing, alone or mixed with wool or other natural protein fibre, with a weakly acid bath of a tanning agent of the naphthalene-monosulphonic acid, dihydroxydiphenyl sulphone, and formaldehyde condensate classes reserves it against acid or chrome dyes. C. O. C.

Dyeing Polyvinyl Derivatives. S. BP 682,175 Polyvinyl derivatives can be dyed of good fastness in aqueous baths containing an insoluble or difficultly soluble dye, dispersing agents, and at least two organic liquids, one of which hardens and the other swells the polyvinyl derivative, e.g. as hardening agent cyclohexanol or an aliphatic alcohol, as swelling agent xylene or carbon tetrachloride. C. O. C.

Vat Dycing of Polyacrylonitrile. DuP. USP 2,598,120. Acrylonitrile polymers are satisfactorily dyed in aqueous baths containing an indigoid, thioindigoid, or related type of vat dye, alkali, a readily ionisable potassium compound, e.g. K₂CO₃, and a reducing agent. C. O. C.

Pigmented Rayon (VI p. 36).

IX-PRINTING

PATENTS

Thickener for Vat Dye Printing Pastes. American Cyanamid Co. USP 2,594,899

Use of water-in-oil emulsions as thickeners for vat dye printing pastes has the advantages over starch-gum mixtures of requiring much less thickener and giving better colour yields. A suitable emulsion consists of an aqueous solution containing water-soluble electrolytes including (a) an alkali-metal hydroxide or carbonate, (b) a formaldehyde-sulphoxylate, and (c) a lignin-sulphonate dispersed in a low-viscosity hydrocarbon oil distilling over 80–400°c. The oil comprises 10–60% by weight of the printing paste and has dissolved in it 4–8% of its wt. of a drying-oil-modified thermosetting alkyd resin.

C. O. C.

Oil-in-water Emulsion for Printing Vat Dyes. American Cyanamid Co. USP 2,597,281

Oil-in-water emulsions can be advantageously used instead of starch-gum carriers in vat dye printing pastes as they give better tinctorial value and do not alter the handle of the printed fabric.

C. O. C.

Applying a Discontinuous Coating to Fabric. Joseph Bancroft & Sons Co. USP 2,598,264

A polymerisable resin is applied, preferably by printing, to only the top surface portions of the threads forming the outer face of the cloth, care being taken to prevent its going into the interstices of the fabric. The surface fibres are then held immobilised in a polished or glazed condition by polymerising the resin. This yields a permanently glazed fabric having the necessary porosity, handle, and softness for clothing purposes. C. O. C.

Block-printing Surface Coverings. Armstrong Cork Co. USP 2.598,386

Spatter designs are produced on linoleum or the like by block-printing several colours on to the foundation of waterproof felt or the like, the blocks having regular geometrical outlines but being of many different sizes. The prints are applied in random arrangement on the foundation. Background coloured paint is printed similarly on to the foundation, the wet spatter and background paints irregularly overlapping at their junctures to provide irregular edges with non-geometrical outlines.

Stencil Printing with Diazo Dyes. Arthur D. Little. USP 2,597,306

The surface to be printed is coated with a mixture of a diazo component and a coupling component together with sufficient acid to stabilise the mixture. Alkali, preferably gaseous ammonia, is then applied through a stencil, and the unchanged diazo compound is destroyed. C. O. C.

Diazotype Compositions containing Unsaturated N-Alkyl Derivatives of Aminodiazo Compounds. General Aniline. Monodiazotisation of compounds of formula—

H₄N NR¹R⁴

 $(\mathbf{R}^1=\mathbf{an}$ alkyl group of <5 C containing at least one unsat. carbon–carbon linkage, which may contain a hydroxyl group; $\mathbf{R}^3=\mathbf{H},$ Alk, hydroxyalkyl, Ar, cycloalkyl, or another $\mathbf{R}^1)$ are excellent light sensitisers in diazotype layers. They may be used with coupling components which yield blues or sepias. C. O. C.

Diazotype Printing. Kalle & Co. BP 682,614
Greater differences between the values of opacity and transmittance to ultraviolet radiation can be obtained when making positives from negatives and vice versa if certain primary or secondary amines, e.g. cyanamide, methylaminoethanesulphonic acid, diethanolamine, aniline-3:5-dicarboxylic acid, etc., are incorporated into the light-sensitive layer. C. O. C.

Diazotype Printing on Siliceous Surfaces. General USP 2,598,453

A method of producing a diazotype layer on a liquidimpervious siliceous surface so as to produce dye images which are not easily rubbed off. C. O. C.

Colour Photography. H. von Fraunhofer and H. E. Coote.

BP 682,061-2

Production of natural colour prints from a two-colour negative.

C. O. C.

Azoic Dyes from Aryl Sulphonhydrazides (IV p. 33). Brown, Metal-complex Azoic Dyes (IV p. 34). Mélange Effects on Wool by Dyeing or Printing (VIII p. 36).

X-SIZING AND FINISHING

PATENTS

Non-slip Finish. Monsanto. BP 681,802
Textiles or other celluiosic materials are given a non-slip finish without change in handle by impregnating them with an aq. soln. of a cationic surface-active agent and then with aq. colloidal silica. C. O. C.

Reducing the Felting Power of Wool. American Cyanamid Co. BP 680,623

If wool is treated with an alkaline solution of a peroxy compound before being impregnated with an aminoplast, then the amount of aminoplast required to bring about the same reduction of felting power as with untreated wool is much diminished, and in addition a cationic aminoplast may be used. The amount of cationic aminoplast required is less than that of an aminoplast which has not been rendered cationic.

C. O. C.

Increasing the Elongation of Terylene without Reducing the Elasticity.

The elongation of Terylene is improved without loss in elasticity by treatment with aq. HNO₃, e.g. for 10 sec.—40 min. with 50–80% nitrie acid at room temperature.

Rendering Fabrics Water-repellent with Organosiloxane Polymers. Dow Corning. BP 680,265 Fabrics of natural or synthetic fibres are rendered waterrepellent by impregnating them with two organosiloxane polymers and then baking at 100-475°r. for 1 hr.-5 sec. One of the polymers is a methylhydrogensiloxane liquid containing 1.0-1.5 CH₃ radicals and 0.75-1.25 H atoms bonded to Si per Si atom, there being in all $2\cdot 0-2\cdot 25$ CH₂ radicals + H atoms per Si atom. The other polymer contains $2\cdot 0-2\cdot 1$ CH₂ radicals per Si atom and has a viscosity of 1,000-100,000 centistokes at 25°c.; it forms 30-80% of the polymer mixture. The water-repellent finish obtained resists laundering and dry cleaning, the proofed materials have good handle and draping quality and improved crease resistance. There is little or no tendency to mark off. C. O. C.

Water-repellent Finish. Harris Research Laboratories. USP 2,597,614

Textiles are rendered water-repellent, and their handle, resiliency, and resistance to abrasion improved, by treating them with an aqueous emulsion of a silicone oil, e.g. of the type prepared according to USP 2,386,259, and then drying and baking.

C. O. C.

Rotproofing. Monsanto. USP 2,594,384
The material is impregnated with a dispersion of a Cu, Zn, or Cd salt of an 8-hydroxyquinoline formed by pasting the salt with a film-forming protective colloid, e.g. methyl cellulose, in presence of a wetting agent and then dispersing this paste in an aqueous solution of a water-soluble amine-aldehyde resin-ferming composition, and then dried and baked. Material which has to withstand severe leaching, e.g. papermakers' felt, is given further treatment with an

aqueous dispersion of a water-repellent agent, e.g. an N-hydroxymethylalkylamide, a dispersing agent, a water-soluble resin-forming composition, and an acidic catalyst.

Rendering Nylon Cloth Heat-resistant by Treatment with Quinones. E. B. Michaels and S. Machlis. USP 2,597,163

Treatment of nylon cloth with aqueous quinones, preferably with 1% aq. benzoquinone at room temp. for 15 hr., renders it heat-resistant when used as cover for laundry presses.

C. O. C.

Awnings. DuP. BP 680,938

Awnings of excellent resistance to tendering on exposure to sunlight consist of cloth coated with a halogenated ethylene polymer, pigment, plasticiser, and MgO.

C. O. C.

Laminating. BrC.

Laminates of high impact strength and low water absorption are obtained by use of fabric, etc. which has been impregnated first with a water-soluble thermosetting synthetic resin and then with a water-insoluble alcohol-soluble synthetic resin.

C. O. C.

Mercerising Tubular-knit Fabric (I p. 31).

Dimensional Stabilisation of Knitted and Woven Fabrics (I p. 31).

Applying a Discontinuous Coating to Fabric (IX p. 37).

XI—PAPER AND OTHER CELLULOSIC PRODUCTS

Reaction between Cellulose and Heavy Water. K. E. Almin. Svensk Papperstidning, 55, 767-770 (31 Oct. 1952).

The reaction has been followed by means of infrared spectrography, completely deuterated cellulose being obtained by hydrolysing cellulose triacetate in a solution of NaOD in heavy water, and the fine structure of the $3-\mu$, and the $4-\mu$. bands compared. Preliminary experiments on the kinetics of the reaction between cellulose and heavy water vapour show that the reaction comprises at least three stages. The possibility of devising a heavy water accessibility method is discussed. S. V. S.

Adsorption of Ammonia by Cellulose. L. Elfving.

Svensk Papperstidning, 55, 794-795 (31 Oct. 1952).

A study of the adsorption of ammonia gas by different cellulosic materials has shown that at room temperature the quantity of gas taken up decreases with increasing a-cellulose content. Alkali-treated cellulose shows extremely high adsorption. The quantity of ammonia adsorbed depends on the drying conditions of the cellulose. Ammonia gas has the ability to drive out the remaining water from cellulose dried in N₂ at 20°c. The adsorption process is very rapid, and dependent on gaseous diffusion. Curves are given showing the adsorption and

desorption of ammonia by cellulose as a function of time. S. V. S.

Bleaching or Brightening Paper. Buffalo Electro-Chemical Co. USP 2,598,580

A web of a mixture of a chemical wood pulp and a bleached wood pulp containing substantial amounts of ligneous and non-cellulosic material is impregnated with a bleaching liquor and then dried so as to leave the constituents of the liquor in the paper. This results in paper of high brightness.

C. O. C.

Resin Treatment of Paper. J. M. Danner and W. Zerweck. BP 682,406

In preparing paper of good wet strength and suppleness, paper or paper pulp is treated with a solution or dispersion of a condensation product of an aminotriazine, a hydroxy-aldehyde, or mixtures thereof with other aldehydes and a polyhydric alcohol. The condensation product has been condensed until insoluble in water; it may be etherified with a monohydric alcohol in the presence of an acidic catalyst, and then used in the form of a solution in an organic solvent or of an emulsion for treating paper by dipping or brushing.

8. V. S.

Paper, G. Mosetti, BP 682,664

Non-waterproof paper suitable for writing and printing is made by adding to the paper stock an emulsion containing minute particles of a filler, e.g. kaolin or barytes, completely covered with a waterproofing medium, preferably paraffin wax, in the presence of a protective colloid, and precipitating and fixing the emulsion on to the pulp fibre with an acidic compound, e.g. aluminium sulphate. The emulsion is produced by dispersing the colloid in aq. alkali, heating and mixing the filler with the waterproofing material, adding to this mixture the dispersed colloid, diluting the whole with water, and homogenising. Additional filling material, e.g. sodium silicate, may be incorporated in the emulsion before use. The homogeniser consists of a cylindrical container with a horizontal shaft rotatable at high speed and carrying sets of radially disposed paddles or blades, side by side, moving between corresponding paddles fitted to the inner wall of the container, with very little clearance between the fixed and moving paddles, and with means for passing the ingredients through the homogeniser in an axial direction. The container may be jacketed for heating or cooling the homogeniser with steam or hot water. For mixing purposes prior to emulsification a rotating jacketed kettle is used which is heated by steam or hot water and is rotatable about a horizontal axis by a pinion meshing with a ring-shaped gear wheel fastened externally to the kettle, which is provided with loading and discharging openings for the materials, as well as with inlet and outlet openings for the heating fluid and the condensate, S. V. S.

Coating Paper. United States Rubber Co. BP 680,998 Paper, having a very high gloss coating with good flexibility, appearance, and abrasion- and scuff-resistance, low odour or flavour, excellent adhesion to the base paper, and enhanced oil- and grease-resistance, is made by applying continuously an aqueous dispersion of a thermoplastic polymeric resin to the surface of the paper, and drying the coated paper at 20°-60°c, above the secondorder transition temperature of the resin, thus removing the water from the coating and causing a discontinuous film of small resinous particles to adhere to the paper. The resinous coating is then glossed and converted into a thin continuous film by a continuous even-speed calendering operation, in which the coated surface is pressed against a highly polished roll surface heated to 40-80°c. above the second-order transition temp., and stripped off at that temp. The material, applied at 0.5–4.0 lb./1000 sq. ft. of surface, may be selected from polystyrene, polyethylene, polyvinyl chloride, polyvinyl alcohol, copolymers of vinyl chloride and vinyl acetate, polymerised methyl meth-acrylate, resinous copolymers of 80-97% by wt. of styrene and 20–3% of butadiene, of 65–80% styrene and 35–20% acrylonitrile, and copolymers of 65–80% acrylonitrile and 35–20% isobutylene having a second-order transition temp. of $40-125^{\circ}\mathrm{c}$.

Anti-sticking Cellulose Films. American Viscose Corpn. BP 681,494

Regenerated cellulose films are rendered resistant to sticking by treating them while in the wet gel state with an aqueous bath containing an acylated polyalkylenepolyamine or a salt thereof. C. O. C.

Cross-linked Polymeric Materials. DuP.

Cross-linking is achieved by reaction of a polythiol or a mercaptide (metal salt) thereof with the active groups of a polymeric material; e.g. hydroxyethyl cellulose acetate-chloroacetate treated with a polythiol or mercaptide is rendered insoluble in solvents for the unmodified chloroacetate.

C. O. C.

XIII—RUBBER; RESINS; PLASTICS

Mechanism of the Transarylation of Diarylalkanes.
G. S. Kolesnikov and V. V. Korshak. Doklady Akad.
Nauk S.S.S.R., 85, 95-98 (1 July 1952).

Mechanism schemes are given for the linear and threedimensional polycondensation reactions of diarylalkanes in presence of Al_{Cla} (see J.s.D.C., 67, 48 (Jan.), 293 (July 1951); 68, 332 (Aug. 1952)) and for the breakdown reaction of the resulting polycondensates in presence of $Al_c Cl_a$ and an aromatic hydrocarbon. They are based on polarisation effects arising from complex formation between the aromatic system and $Al_c Cl_a$. A. E. S.

PATENTS

Waterproofing of Protein Plastics. B.X. Plastics. BP 681,429

The products obtained by treating a protein with formaldehyde and a mononuclear aromatic carboxylic acid show unexpected toughness and resistance to water.

Vinylidene Cyanide Copolymers. B. F. Goodrich Co. BP 681,120

When vinylidene cyanide is copolymerised with certain other monomers in presence of a free-radical catalyst, so that the proportion of vinylidene cyanide is within a certain specified range depending on the type of the second monomer, the products are essentially 1:1 alternating copolymers having the structure $\mathbf{M}_1\cdot\mathbf{M}_2\cdot(\mathbf{M}_1\cdot\mathbf{M}_2)_Z\cdot\mathbf{M}_1\cdot\mathbf{M}_2$ ($\mathbf{M}_1=\mathrm{vinylidene}$ cyanide; $\mathbf{M}_2=\mathrm{a}$ unit of the second monomer; x>0). The products are extremely useful in the preparation of filaments and films. W. G. C.

Organic Pigments and Moulding Powders. Calico Printers' Assocn. BP 682,194
Modification of BP 582,019 (J.s.D.C., 63, 278 (1947)), the aromatic polyvinyl acetals being formed at pH 0.5–2.6 in presence of a dispersing agent, and the concn. of the polyvinyl alcohol being up to 20% by wt. of the reaction mixture when a low-viscosity polyvinyl alcohol is used. C. O. C.

When styrene is copolymerised with acrylic acid or its derivatives and a glycidyl acrylate so that no reaction occurs between the epoxide ring of the glycidyl acrylate and the carboxyl of the acrylic acid, a linear thermoplastic compound useful as a coating material is obtained; on heating, the compound becomes cross-linked. W. G. C.

Glycidyl Acrylate Copolymers. Canadian Industries

Cross-linked Polymeric Materials (XI p. 38).

XIV-ANALYSIS; TESTING; APPARATUS

Spectrophotometric Determination of Mixtures of o- and p-Alkylated Phenols—a-Phenylethylphenols. H. Hart. Anal. Chem., 24, 1500-1501 (Sept. 1952).

The ultraviolet spectra of o- and p-phenylethylphenols are given, together with a nomogram relating the % composition of mixtures of the two to the extinction coefficients at 273 and 285 m μ . Within the range of 5–95% of one isomer the % composition may be estimated within 1%. The method may be applied to many pairs of o- and p-alkylated phenols; the optimum wavelength, which should be determined in each case, is generally between 273 \pm 2 and 285 \pm 2 m μ . Any meta isomer which may be present is likely to be included with the ortho, since their spectra are almost identical. Mixtures of 2:4- and 2:6-dialkylated phenols and of hindered phenols may also be analysed by this method. J. W. D.

Improved Method of Preparing Sulphonated a-Naphthol for Carbohydrate Tests. A. W. Devor.

Anal. Chem., 24, 1626 (Oct. 1952).

When the Molisch test is used to detect small amounts of carbohydrate, better results are obtained if the anaphthol is first sulphonated; previous methods for doing this have yielded only aqueous soln. of the sulphonated naphthol together with some dark colouring matter which interferes with the test. Preparation, storage, and use of a sulphonated naphthol in solid form, and free from coloured impurity, are described. In this form it may be dissolved to give a soln. of any desired conen.

J. W. D.

Detection and Differentiation of 3:4- and 2:5-Dihydroxyphenyl Compounds related to Tyrosine. C. E. Dalgliesh. J.C.S., 3943-3945 (Oct.

Methods are described by which the 3:4- and 2:5dihydroxyphenyl compounds related to tyrosine metabolism can be distinguished. The reagents chromatographically used are the Folin-Denis, Folin, Millon, and Pauly reagents. A table of results is given. H. H. H. Coupling Azo Dye Methods for Histochemical Demonstration of Alkaline Phosphatase. E. Grogg and A. G. E. Pearse. Nature, 170, 578-579 (4 Oct. 1952).

Determination of Coupled Aromatic Nuclei in an Azo Protein. C. E. Weill. Anal. Chem., 24, 1617– 1618 (Oct. 1952).

Proteins which have been joined to an aromatic nucleus through an azo linkage have been used in chemical investigations of altered proteins. Such linkage may take place with tyrosine or, under appropriate conditions, with other amino acids in the protein chain. The mol. extinction coefficient of arsaniloazotyrosine has been measured, and may be used to calculate the number of azo groups in any arsaniloazo protein for which the sp. extinction coefficient has been measured. This may be done by comparing the light absorption of the azo protein with that of the same diazotised amine coupled with an excess of tyrosine. The method is rapid.

J. W. D.

Simultaneous Estimation of Threonine and Serine. B. A. Neidig and W. C. Hess. Anal. Chem., 24, 1627-1628 (Oct. 1952).

Protein is oxidised by HIO₃ with continuous aeration. Acetaldehyde formed from the threonine is carried over into traps, where it may be estimated by the development of a violet coloration with p-hydroxydiphenyl which may be measured in the spectrophotometer, whilst the formal-dehyde formed from the serine remains in the reaction tube and is estimated photocolorimetrically using chromotropic acid. Two procedures are described, one being suitable for samples of 2–10 μ g., the other for those of 20–100 μ g. Amongst the proteins examined by this method are gelatin and casein; in the case of the former, a correction must be made for hydroxylysine, which interferes. Coefficients of variability of the method are 5-9% for threonine and 7-7% for serine. J. W. D.

Determination of Small Quantities of Alginates in Rayon Finishes and on Yarn. E. G. Brown and T. J. Hayes. Analyst, 77, 445-453 (Sept. 1952).

Ammonium di- or tri-ethanolamine alginate (or sodium alginate in soln.) is estimated by hydrolysing the alginic acid to furfural and treating this with Bial's reagent (orcinol and a ferric salt in HCl soln.) to give a greenish-blue coloration, which is assessed absorptiometrically at ~620 mµ. A Spekker calibration curve must be derived, the relationship not being strictly linear, and full directions are given for doing this. Alginic acid concn. up to 0.8 g./litre may be determined with satisfactory precision, with an optimum range at 0.2–0.5 g./litre. Alginates are completely removed from rayon yarn prior to estimation, by treating 0.1–0.15 g. of the yarn for 2–3 hr, with dist. water in a semimicro Soxhlet extractor. The free bases (ethanolamines) which are liberated do not affect the

Identification of Stabilising Agents [Polysaccharides and Gelatin]. M. H. Ewart and R. A. Chapman, Anal. Chem., 24, 1460-1464 (Sept. 1952).

A scheme for the identification, of gelatin and polysaccharides such as alginates, starch, Irish moss, methyl and carboxymethyl cellulose, natural gums, and pectic substances. Differentiation is based on precipitation reactions with CaCl₂, NaOH, Ba(OH)₂, Pb(CH₂·COO)₄, (NH₄)₂SO₄, Hg(NO₂)₂, papain, gelatin, and a cationic soap. Full experimental details, tables, and a number of confirmatory tests (where these are available) are given.

Viscometer for Dextrin Pastes, W. R. Fetzer, E. K. Crosby, and R. E. Fullick. Anal. Chem., 24, 1671– 1672 (Oct. 1952).

An outflow viscometer of specified dimensions, whose orifice is a 2·31-mm. hole in a stainless steel plate. The body of the instrument is simply made by adaptation of a Buel funnel, the orifice plate being fitted into the plastic screw cap. The orifice may be more easily reproduced than glass ones which are in common use, and it is not subject to gradual increase in diameter resulting from the use of borax in the dextrin paste tested. Details are given of the construction and calibration.

J. W. D.

Colorimetric Determination of Pectic Substances. E. A. McComb and R. M. McCready. Anal. Chem., 24, 1630-1632 (Oct. 1952).

A critical study of the variables in the Stark method

(Anal. Chem., 22, 1158 (1950)), which is based on the reaction of anhydrouronic acid with carbazole in conc. H_{*}SO₄ soln. to produce a blue coloration which may be measured spectrophotometrically. The concn. of H_{*}SO₄ is critical, and is at an optimum at 87%. There is also an optimum value for carbazole conen., since the development and fading of the coloration are both accelerated by rising carbazole conen. A preliminary de-esterification with 0·05 N-NaOH is essential, since carbomethoxy groups lead to low results. Uronic acids other than anhydrouronic acid react also to different extents, and may interfere if present in sufficient quantity. Precision of the method is 2%, and comparative tests show it to be superior to the following methods for estimating pectins— (i) Titration of free carboxyl groups, (ii) liberation of CO₂ by HCl, and (iii) isolation of calcium pectate followed by estimation of the Ca.

Estimation of Mixed Phenyl- and Ethyl-mercuric Compounds. D. Polley and V. L. Miller. Anal. Chem., 24, 1622–1623 (Oct. 1952).

A modification of the diphenylthiocarbazone (dithizone) method previously described by the authors (Anal. Chem., 23, 1286 (1951)), by which both may be estimated when present in the same soln. It is based on the rapid decompof phenylmercuric cpd., and the relative stability of ethylmercuric cpd. in HCl; the former are estimated by difference. By shaking in $12\,\text{n-HCl}$, as little as 7 μg . of ethylmercuric phosphate may be determined in presence of $3600\,\mu\text{g}$. of phenylmercuric acetate, and a mixture of $200\,\mu\text{g}$. of the former and $19\,\mu\text{g}$. of the latter may be analysed. The accuracy is better when the ethylmercuric cpd. predominates.

PATENTS

Measuring or Controlling Strip Thickness. R. Viselé. BP 680,695

Yarns, strips, or sheets of an insulating or dielectric material, e.g. textiles, are passed between the plates of a condenser forming the capacitance of an oscillatory circuit, the frequency of which varies according to the thickness of the material passing through. Variations in oscillation are transformed by a discriminator into voltage variations, which may be used either for measuring or for controlling the thickness.

J. W. B.

Measuring Colour. J. M. Hall. BP 677,129

The primary colour values of a surface are measured by

illuminating it with light of given colour temperature. mirror with a light-transmitting spot within its reflecting area is placed so that the surface may be viewed by reflection in the mirror surrounding the spot, thereby forming a first light path from the light source via the surface to the face of the mirror. A second light source giving light of the same colour temperature as the first source is placed so as to back-light the light-transmitting spot, thereby forming a second light path to the face of the mirror. Means are provided to vary the illumination at the face of the mirror from at least one of the paths, so that a balance may be obtained between the lighting at the face from the two paths. Identical colour filters can be placed in the two paths, each filter being characterised by being impervious to a given primary colour while transmitting the other primary colours. Calibrated means in the second light path enable rebalancing of the light at the face of the mirror from the two paths by varying the illumination from the second path, thereby indicating the amount of illumination change from the first balance.

Measurement and Control of the Moisture Content of Textiles. Electric Construction Co. BP 676,126

The moisture measurement is made by connecting a predetermined length of the material to form part of the mput circuit of a magnetic amplifier, so that the input current is controlled by the resistance of the material, the output current being used to operate a measuring instrument.

C. O. C.

Laboratory Drying Ovens. S. F. A. Ekelund.

A drying oven of the type used for drying single samples of preparations in separate open containers comprises a compact metallic body having a large heat capacity and good conduction properties, surrounded by an insulator and containing the heater and one or more cavities. Each

has separate ventilation and is so shaped that heat conduction is facilitated; the great heat capacity of the surrounding metal results in only small temperature drops when samples are inserted, and the full temperature is rapidly regained.

J. W. B.

Fabric Wear Tester. H. F. Clapham. USP 2,590,839

The samples held in clamps extending radially from a rotating hub are rubbed against a concave abrading surface by the centrifugal force of their rotation.

C. O. C.

Electrical Apparatus for Detecting Changes in Composition of a Liquid. Wallace & Tiernan Products. BP 677,599

Apparatus for detecting changes in concentration of a reagent in water, e.g. in a chlorination-type water-purification system, comprises a conductivity cell in circuit with the secondary of a transformer, means for supplying current to the transformer primary, and a device for detecting departure from a predetermined limiting value of the impedance of the primary in response to changes in the conductivity of the liquid.

J. W. B.

Reaction between Cellulose and Heavy Water (XI p. 38).

XV- MISCELLANEOUS

Statistical Treatment of Experimental Data. A. Lord. J. Oil & Col. Chem. Assocn., 35, 437-447 (Sept. 1952).

Two important statistical techniques, the fitting of regression lines and the analysis of variance, are discussed. The need for a correct estimate of error is emphasised in order to assess the effect of a change of an experimental factor or the curvature of a graph. If equally spaced experimental results are used, it is possible to fit curves of high degree and to determine to what degree the fitting should be carried. Variance analysis of multifactor experiments is quickly and simply carried out if factors are used at two levels only.

A. J.

Examples of the Statistical Approach to the Planning and Interpretation of Industrial Experiments. B. Saunders. J. Oil & Col. Chem. Assocn., 35, 448-

458 (Sept. 1952).

The use of the Latin Square for studying the crinkling of a synthetic enamel, and of a factorial experiment to elucidate the effects of certain factors in the formulation.

elucidate the effects of certain factors in the formulation of a stoving finish, are described. The statistical and classical methods of approach are compared. A. J.

Starting a Small Industrial Library. E. B. Uvarov.

Research, 5, 510-514 (Nov. 1952).

A guide for anyone intending to start a technical library. Suggestions are made for the planning and establishment of the library, policy with regard to it, and the qualifications required of the librarian.

C. O. C.

PATENTS

Colouring Starches, etc. Alfred Bird & Sons.

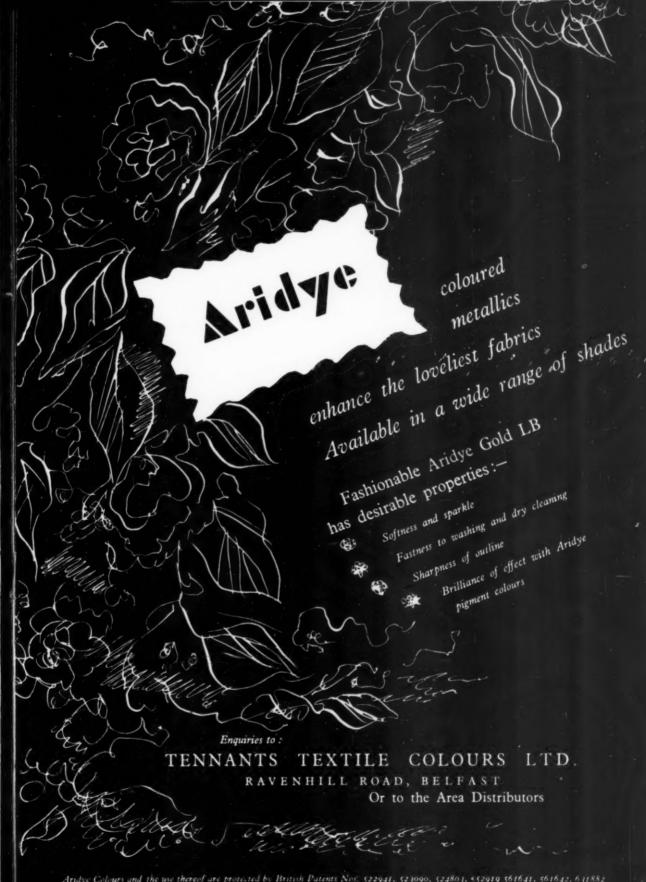
Even coloration which prevents "spotting" in the finished foodstuff is obtained, and loss of material during drying and grinding is avoided, by mixing the damp starch with a finely divided solid water-soluble colouring matter, and while continuously agitating the mixture heating it to drive off some of its moisture content.

C. O. C.

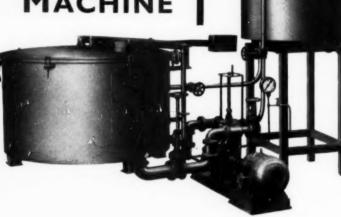
Manufacturing Articles of Fibrous Material. Phillips
Electrical Industries. BP 683,908
In making lighting fittings, e.g. lampshades and

In making lighting fittings, e.g. lampshades and reflectors, a fibrous paste containing auxiliary materials such as binders and colouring matter is projected, e.g. sprayed under gas pressure, against the surface of a non-porous mould so that the fibres are directed substantially parallel to this surface and, without the application of pressure, a coherent layer is produced, which is subsequently dried and removed from the mould. A layer of a detaching agent, e.g. a stearate, may be applied to the mould, and parts that must serve for reinforcement or decoration of an object, particularly metallic parts, are deposited on the mould, which may have been provided with a layer of fibrous paste, and such parts are covered with a thin layer of glue. After drying, the object is impregnated with varnish, or a priming layer followed by a varnish layer is provided and subsequently a reflecting layer is applied, e.g. by evaporation of aluminium.

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FORTHCOMING MEETINGS OF THE SOCIETY — continued from page xii

All meetings	to be held in the Colour Chemistry Lecture	West Riding Section—continued			
	University, Leeds, 2 on Tuesdays at 4.0 p.m.	Tuesday 3rd March	Dr. H. Baines (Kodak Ltd.). Colour Photography. The University, Leeds		
17th Feb.	G. G. Taylor, Esq., B.Sc., A.Inst.P. and J. C. Brown, Esq. (The Clayton Aniline Co. Ltd.). The Uses of Microscopy in Textile Dyeing and Finishing	Thursday 12th March	Dr. J. F. Gaunt (Patons & Baldwins Ltd.) A Study of the Afterchrome Process of Dyeing Wool		
3rd March	D. Hanson, Esq., B.Sc., F.R.I.C. (J. Crowther & Sons Ltd.). A Chemist in the Woollen Industry WEST RIDING SECTION	Thursday 26th March	Annual General Meeting		
		BRADFORD JUNIOR BRANCH All meetings held in the Bradford Technical College			
All meetings h	All meetings held at the Victoria Hotel, Bradford, at 7.15 p.m.		at 7.15 p.m.		
	unless otherwise stated	1953 Wednesday	Visit to Messrs, Montague Burton Ltd.,		
1953 Thursday	Dr. C. S. Whewell. Some impressions of the	4th Feb.	Hudson Road Mills, Leeds		
29th Jan.	Canadian Textile Industry	Wednesday	T. Green, Esq. (Clayton Aniline Co. Ltd.).		
Thursday	D. P. Raper Esq. (Imperial Chemical Industries Ltd). Wool Dyeing Faults and their Correction	18th Feb.	The Measurement of pH and its Importance in Relation to Textile Processing		
		Thursday	JUNIOR BRANCH DANCE at the Queens Hall		
	N. R. Hjort, Esq. Water Treatment. (Joint lecture with the Halifax Textile Society). Alexandra Cafe, Halifax	26th Feb.			
		Friday 13th March	STUDENTS' ANNUAL COMPETITION EVENING		
Thursday 26th Feb.	J. V. Summersgill Esq. (Geigy Co. Ltd.). Title later	Thursday March 26th	FILM EVENING		

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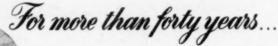
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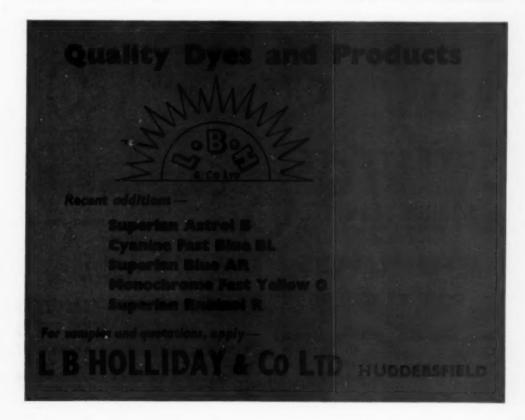
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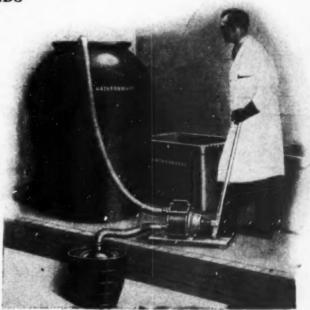
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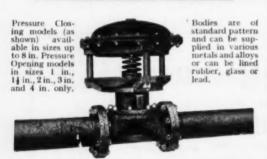
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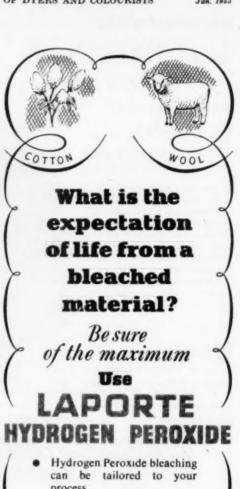




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